PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Vol. 110, No. 12 Thursday, March 21, 1940 Price Ten Cents

Kimberly-Clark to Erect New Wadding Unit

Expect To Begin Construction Soon On Manufacturing Plant of Crepe Wadding Div. of Kimberly-Clark—Forest Products Laboratory Gets $665,000—Monopoly Charged In Board—Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 18, 1940—Within about a week construction will be started by Kimberly-Clark Corporation, Neenah, Wis., on a new manufacturing building for the expansion of its crepe wadding division and development of coarse insulation. S. F. Shattuck, vice-president, announced last week that the general contract has been awarded to the Siesel Construction Company, Milwaukee, Wis. The building is one unit of the company's modernization and expansion program.

The building will be two stories and basement, 76 by 240 feet, of reinforced concrete and steel, with architecture in the modern trend. It will be located on the bank of the canal at Neenah between the Old Neenah mill and the Badger-Globe mill buildings.

One high speed crepe wadding machine is to be installed on the second floor, and space is provided for another to be added later when business warrants.

Paper Machine Being Remodeled

The company is also rehabilitating the No. 1 machine in the Badger-Globe mill for the manufacture of coarse wadding, used as insulation for homes, automobiles, refrigerators and other units. As soon as the remodelling has been completed this spring, the manufacture of coarse wadding will be transferred to this mill from Niagara Falls, N. Y. It is expected the product will be placed on the market in November.

Erection of a bridge of concrete and steel across the canal by Fluor Brothers Construction Company, Oshkosh, Wis., is nearing completion. It is expected the bridge will be ready for use by the middle of April, greatly facilitating the movement of trucks between mills.

Negotiations which are being carried on by the City of Kaukauna, Wis. to dispose of the former Patten Paper Company mill are with the Sangamon Paper Grading Company of Chicago, whose identity was not previously revealed. Samuel J. Cohen, treasurer, has been in conference with city officials, and the proposal for taking over the mill is to be acted upon at a meeting of the city council March 19.

Under the terms proposed, the company will pay the city $4,000 in cash, and the mill will be placed on the property tax rolls at a valuation of $50,000, on which annual taxes will be approximately $1,350 per year. The company is to furnish a bond stating it will operate the plant as a paper mill, and that any sale must be to a concern which will carry on the same work.

As soon as the deal is completed, the company will begin the manufacture of No. 2 kraft wrapping paper from waste kraft paper collected from paper box factories. An engineer of the company has checked over the equipment, which includes two machines with a capacity of 31 tons per day. Production is to be increased to 47 tons when the machines have been overhauled.

The mill has been idle for a number of years, and was bought by the city in payment for back taxes in 1937. The valuable water power has been utilized by the city to build a new hydro-electric plant for municipal operation.

Forest Laboratory Gets $665,000

Congressional efforts to increase the appropriation for the United States Forest Products Laboratory at Madison, Wis., have brought from the Senate appropriations committee a vote to add $65,000, bringing the total to the budget estimate of $665,000 for the fiscal year 1941.

Secretary of Agriculture Wallace appeared before the committee and declared that "in projects such as pulp and paper and timber harvesting, the Laboratory would be forced to curtail already limited work on the utilization of southern hardwoods at a time when the need for research results is increasing, and the research is beginning to bring results.

Senators La Follette and Wiley and Representative Hawks of Wisconsin had urged the committee to raise the appropriation to $1,000,000. Senator La Follette told the committee paper mill regions in New England, west, middle west and the south were losing 1,500,000 tons of lignin and wood fiber as pulping wastes discharged into streams and waterways. He said recovery of this loss would reduce

(Continued on page 43)

Chicago Paper Market Reports Spotty Trade

Some Paper Merchants Continue To View Immediate Future With Optimism But Midwest Market Is Now Marking Time—Paper Prominent In Coming Chemurgic Conference — Salesmen Plan Golf Season.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 18, 1940—Optimism over slightly improved conditions in the Chicago paper market during last week changed into a more pessimistic vein during the past six days when expectations of better business generally failed to materialize. The spotty condition of most of the markets was reflected in the reports of the varied interests where a few executives were optimistic though the majority were still doubtful as to the immediate upturn expected.

Despite the European situation and the resultant comparative scarcity of raw materials, there was reported a sufficient lack of demand to create a more or less depressed condition and those anxious to get the business regardless of the price were giving a reportedly shaky tone to some lines. In general, bonds and ledgers retained somewhat of a status quo. Sulphites showed a little disposition to move upward. Books were reported weaker than last week with covers in a similar position. Krafts were not as strong as a week ago. Newsprints and groundwoods were likewise reported to be more or less marking time. Waste papers were weak.

David Weil Gives Luncheon Talk

David M. Weil, secretary-treasurer of the Cromwell Paper Company, spoke at the weekly luncheon of the Illinois Committee of the Chicago Association of Commerce on Thursday noon, March 14 at the LaSalle Hotel. Mr. Weil, speaking before representative Chicago business leaders, gave a keen analyzation of the economic conditions in Germany, the Balkan countries and other countries which will have a direct bearing on the outcome of present difficulties abroad. Mr. Weil has for many years been a close student of foreign affairs, has traveled extensively abroad and now conducts a widely read column in the Chicago Journal of Commerce called "Notes on Foreign Affairs". The Chicago paper executive has successfully predicted many developments of the war and particularly the details of the economic warfare which has occurred and the most recent developments in Balkan countries. Mr. Weil's father is president of the Cromwell Paper Company, nationally known distributors of tympan papers and other allied products.

Paper Prominent in Chemurgic Meeting

Paper is to have a prominent part in the sixth annual Chemurgic Conference of agriculture, industry and science to be held in Chicago March 27, 28 and 29. At a general session on March 28, H. C. Fisher, chief chemist of the Gardner-Richardson Company of Lockland, Ohio, is to collaborate with Clinton T. Revere of Laird, Bissell & Meeds of New York City, in a discussion of "Paper Milk Containers for Individual Use", which ought to create quite a bit of interest in Chicago at this time. On the final day of the meeting Harry H. Straus, president of the Ecusta Paper Company of Pisgah Forest, North Carolina, is to discuss "Cigarette Paper, an American Industry". Discussions on wood wastes and the use of agricultural products are also to be parts of the interesting program at the Stevens Hotel.

Salesmen to Open Golf Season in May

The midwest division of the Salesmens Association of the Paper Industry believes the Spring is a lot nearer than the weather would indicate. Under the guidance of golf chairman "Pat" Patterson, the salesmen spent a part of the time at the luncheon meeting this week discussing the type of courses on which they were to play their five tournaments this coming season. The assistant chairman will also be announced within the next week or so and arrangements gotten under way for the initial tournament in May.

Government Paper Bids

WASHINGTON, D. C., March 20, 1940—Marquette Paper Company has been awarded the contract for furnishing the Government Printing Office with 67,800 pounds (300,000 sheets) of 24½ x 32½ single ply white sulphite index at 5.4 cents. Same company will also furnish 13,671 pounds (31,500 sheets) of 36 x 42½ buff sulphite index at 5.6 cents. Perkins-Goodwin Company will furnish 85,400 pounds (700,000 sheets) of 28 x 34 white sulphite writing paper at 4.875 cents. Bids for these items were received on February 28.

Fitchburg Paper Company will furnish 106,200 pounds (1,180,000 pounds) of 27½ x 39 M. F. book paper at 5.16 cents, bids for which were received on February 16.

Whitaker Paper Company will furnish 1,500 pounds (75,000 sheets) of 24 x 36 manila tissue paper at 9.7 cents, bids for which were received on February 12.

R. P. Andrews Paper Company will furnish 7,425 pounds (90,000 sheets) of 17¾ x 36¼, 100 per cent rag, white recording chart paper at 34.5 cents, bids for which were received on February 9.

A. R. Heron on Paper Committee

WASHINGTON, D. C., March 20, 1940—The appointment of A. R. Heron, of San Francisco, Cal., as a representative for the employers on the Pulp and Primary Paper Industry Committee, has been announced by the Wage and Hour Division, Department of Labor.

Mr. Heron, Director of Industrial Relations of the Crown Zellerbach Corporation, San Francisco, will fill a vacancy on the Committee occasioned by the resignation of J. D. Zellerbach, president of the Crown Zellerbach Corporation. Mr. Heron has for a number of years been Director of Industrial Relations for this corporation, which has extensive interests in many branches of the paper industry throughout the United States.

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LUFKIN, TEXAS—MARCH 1940

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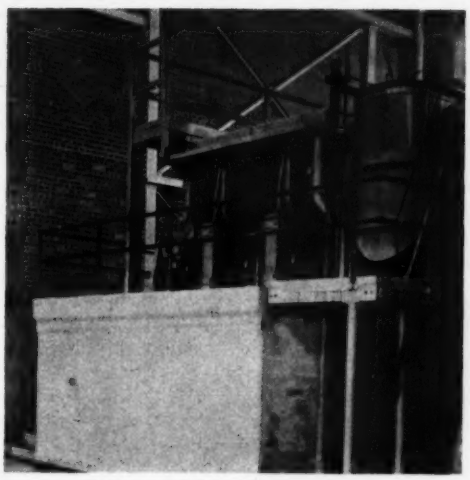
BIRD SCREENS HANDLE ALL SOUTHERN NEWSPRINT!



Here you see a part of the model installation of four big 3A Dual Drive Bird Screens at Southland Paper Mills.

Almost the entire world production of newsprint now passes through Bird Screens. They assure continuous, high speed production of clean, uniform stock at lowest screening cost per ton.

Vickery Hi-Flex Doctors Keep All Southland Calender Rolls Continuously Shining

Every roll in every Southland calender stack keeps 100% clean and smooth. There'll be no calender marks. Clearing the stacks and re-threading after breaks is accomplished in minimum time.

For the latest news on how to make better paper and more of it per day at lower cost per ton, write

BIRD MACHINE COMPANY SOUTH WALPOLE, MASS.

Wright built the famous Imperial hotel in Tokio, which withstood earthquakes where all other buildings had fallen. He produced the Larkin building in Chicago in 1905, first structure in the United States to employ metal-bound, plat-glass doors and windows; all-metal furniture; air conditioning, and magnesite as a material

In Boston, a hotbed for architects of all persuasions, Wright is regarded either as a genius who must be tolerated, an architect who must be harkened to or an exhibitionist bound to attract public attention.

Whatever the correct diagnosis of this unconventional iconoclast who is not afraid to do what he likes and say what he thinks, he is, like

The curious camp which Wright and his satellites occupy in Arizona, after arriving there in a moto: caravan painted in the leader's favorite color, Cherokee red, looks like nothing more than a series of packing boxes held in crazy patterns.

Less bizarre but no less divergent from standard themes are the pri-

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CONSTRUCTION NEWS

Memphis, Tenn.—The Shelby Paper Box Company, 61 West Colorado street, manufacturer of corrugated shipping containers, folding paper boxes, etc., has awarded general contract to the H. K. Ferguson Company, Hanna Building, Cleveland, Ohio, for proposed new plant at 1170 North Manassas street, near Firestone boulevard, where 15-acre tract of land was recently acquired, as previously noted in these columns. New plant will comprise a main one-story unit and several smaller auxiliary structures, and will be equipped for large capacity. Company is disposing of present plant at first noted location, and will provide the new factory with considerable new machinery. It is reported to cost close to $150,000, with equipment, instead of smaller sum, previously mentioned. The Ferguson company, noted, also prepared plans for the structures. Foster A. Jones is assistant general manager of company.

Brooklyn, N. Y.—The Standard Corrugated Case Corporation, 48-08 30th place, Long Island City, manufacturer of corrugated boxes and containers, has arranged for lease of one-story industrial building at 59 Paidge avenue, Brooklyn, on site about 260 x 500 feet, extending to Newton street. The structure totals about 50,000 square feet of floor space, and will be used for new plant. Equipment and facilities will be installed for large capacity. Property will be taken over at early date.

Danville, Va.—J. B. Dove, Atlanta, Ga., is at head of project to establish and operate a new mill at Danville for production of a new type of cellulose rayon, using pine wood for pulp service. Danville Chamber of Commerce is interested in project and has secured a building on Newton street, to be occupied under lease. Property will be taken over at once and improvements made in structure, which will be equipped for initial output of about 1000 pounds of cellulose rayon per day, with pulp and grinding departments arranged for increased output at later date. Mill will operate under a new process, for which patents are held by Mr. Dove, who will organize a company, it is stated, to carry out the project.

Albany, N. Y.—The Eastern Tablet Corporation, 1315 Broadway, manufacturer of writing tablets and kindred paper products, has completed plans for new addition to paper converting plant, to be two-story and basement, 60 x 100 feet, reported to cost close to $45,000, with equipment. Bids have been asked on general erection and it is proposed to proceed with work in April.

Pensacola, Fla.—The Armstrong Cork Company, manufacturer of insulation products, has completed plans for new one-story addition to mill at Pensacola, used for the production of insulating materials for house and other service. It will be equipped for expansion in finishing division, and will be known as Building No. 13. Cost reported over $40,000, with equipment. Bide are being asked on general contract and erection is scheduled to be placed under way at early date.

Jamaica, L. I., N. Y.—R. H. Macy & Co., Broadway and 34th street, New York, department store, plans installation of a paper box and container department, with paper converting and packaging divisions for food specialties, drugs, cosmetics and kindred products, in new industrial plant at 184-10 Jamaica avenue, Jamaica, where company has arranged for lease of group of three and five-story industrial buildings, totaling about 106,000 square feet of floor space, owned by the Art Color Printing Company. Complete manufacturing departments will be installed for lines of products noted, with new automatic machinery and processing equipment. Willard H. Larsh, general manager of company plant at 47-44 Thirty-first street, Long Island City, will be in charge of operations.

Marseilles, Ill.—Certain-teed Products Corporation, 100 East 42nd street, New York, N. Y., manufacturing of roofing products, insulating papers, building papers, etc., is considering new addition to branch plant at Marseilles, to be one-story, reported to cost in excess of $50,000, with equipment.

Bogalusa, La.—The Gaylord Container Corporation, 2820 South 11th street, St. Louis, Mo., manufacturer of corrugated paper boxes and containers, has awarded general contract to the L. O. Stocker Company, Arcade Building, St. Louis, for one-story addition to paper board mill at Bogalusa, totaling about 12,000 square feet of floor space, to be used for general operations. An air-conditioning system will be installed. Cost reported close to $50,000, with equipment. Erection is scheduled to be placed under way at once.

Mobile, Ala.—The National Gypsum Company, 190 Delaware avenue, Buffalo, N. Y., manufacturer of fiber insulation board, wall board and allied products, has awarded general contract to the H. K. Ferguson Company, Hanna Building, Cleveland, Ohio, for new addition to branch mill at Mobile, recently referred to in these columns. It will be one-story, about 80 x 600 feet, designed for storage, distribution and other service. Cost estimated about $150,000, including equipment. Work is scheduled to be placed under way at once. The Ferguson company also prepared plans for the building.

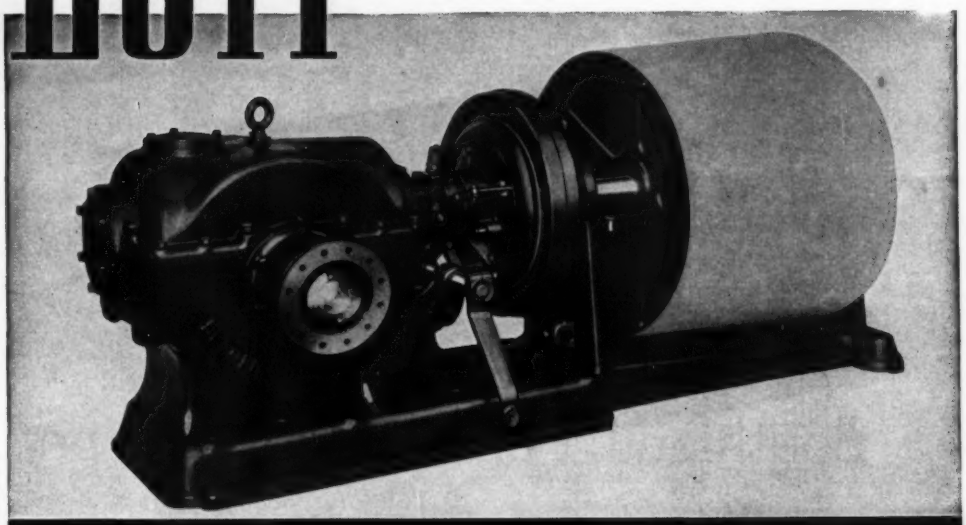
Drummondville, Que.—The Dennison Manufacturing Company of Canada, St. George street, manufacturer of paper tags, labels and other paper specialties, affiliated with the Dennison Manufacturing Company, Framingham, Mass., has plans under way for new addition to plant, to be one-story, reported to cost close to $45,000, with equipment. Erection will begin soon.

New Companies, Etc.

East Hartford, Conn.—The Burnside Company has been organized with capital of $50,000, to deal in paper products of various kinds. The incorporators include J. H. Williams, Hartford; W. G. Parsons and R. H. Harris, Jr., both of West Hartford.

New York, N. Y.—The Melburn Paper Company, Inc., has been organized with capital of $20,000, to deal in paper products of various kinds. The new company is represented by S. F. and J. F. Katz, 25 West Forty-third street, New York, attorneys.

BELOIT



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Equipped with improved Beloit automotive type clutch having unusually large air-cooled friction plate area. Oil lubricated throw out collar.

BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS.

THE BELOIT WAY IS THE MODERN WAY

BELOIT IRON WORKS, Beloit, Wisconsin, U. S. A.

Southland Paper Mills Incorporated

Lufkin, Texas

Written for the Paper Trade Journal by Victor H. Schoffelmayer

A new epoch in the North American papermaking industry doubtless was begun on January 17, 1940, when the first commercial newsprint made entirely from Southern yellow pine was produced at Southland Paper Mills, Inc., the pioneering $6,000,000 plant located in the East Texas pineywoods two miles from the thriving little industrial city of Lufkin.

This new paper is revolutionary and offers a challenge to a long established industry which in the past has depended almost wholly upon the great forests of spruce, balsam, hemlock and related species of the Northern United States and in later years of Canada and the Pacific Coast.

Southland Mill's newsprint paper is made of approximately 80 per cent ground wood produced at the mill from loblolly, shortleaf and some longleaf pine. To this is added about 20 per cent sulphate pulp, also made from pines, at Champion Paper and Fibre Company's $5,000,000 plant at Pasadena, near Houston, Texas. Certain economies under this arrangement have been effected, although it is not at all impossible that at some time Southland may produce its own sulphate pulp.

The East Texas newsprint mill has a production of 150 tons of newsprint a day or about 50,000 tons a year.

At a time of great world disturbances, disrupted commerce with foreign nations and steadily changing economic conditions, it is not unlikely that significant changes are taking place in American newsprint manufacture. It is not unlikely that impending changes may affect much more than merely newsprint mills, because of the ability of Southern forests, under proper management, to produce pulpwood in a program of periodical renewal on the same land.

An evaluation of the South's undoubted assets, such as abundance of sulphur, salt, caustic soda, limestone, clay and cellulose, to say nothing of the region's low cost fuel in the form of petroleum and natural gas in fabulous quantities, and lastly, accessibility to tide-water and low cost transportation, would seem to indicate that a drift of the paper industry to the pineywoods would offer outstanding advantages. With the steady depletion of pulpwood forests in the Northern United States and in Canada the rapidity of growth of Southern pines, such as loblolly and slash, is likely to become a factor of first consideration. The South's challenge must be taken seriously.

Eyes Focused Upon the South

For more than one year the eyes of the nation's paper makers have been focused upon the South, more especially upon East Texas, a region possessing some 12,500,000 acres of loblolly, shortleaf and longleaf pines, with an estimated standing supply of 70,000,000 cords of pulpwood awaiting mill consumption. Ever since a group of daring Texas and Southwestern newspaper publishers early in 1938 pledged to take the full output of newsprint from the Lufkin mill for five years at Canadian prices it was only a matter of time until such a mill would come into being. Recent federal surveys show that the pine forests of the South embrace an area of more than 200,000,000 acres, with climatic conditions favorable to rapid reproduction of timber and pulpwood. Growth studies seem to prove that Southern pines grow four or five times as rapidly within, say, a period of ten or twenty years, as Northern spruce, hemlock, balsam and other species upon which newsprint manufacturers up till the present have largely depended. An industry which is so clearly

dependent upon an ever renewable supply of pulpwood nearby may well look into the opportunities which the Deep South now offers in a field which heretofore has looked askance at Dixie.

Southland paper Mills can be looked upon as the direct result of the more than ten years of continuous advocacy of a newsprint industry for the South by the late famous Dr. Charles H. Herty, for years director of the Savannah, Ga., Pulp and Paper Laboratory, which later became the Herty Foundation Laboratory.

It was Dr. Herty's vision and knowledge of the South's potentialities which gave the needed impetus to the movement which made the East Texas newsprint mill a reality. It had been believed generally that Southern pines contained so great an amount of resin that they were unfit for making white paper except at prohibitive cost. Dr. Herty had tests made which convinced him that young loblolly, slash, shortleaf and longleaf pines do not contain prohibitive quantities of pitch and that what pitch there is can be handled by a properly determined technology. The fact that at the mill site of Herty, named after the scientist, there is now being made newsprint from these pines, which were once believed to be wholly unfit for the purpose, is sufficient proof that Dr. Herty was right. Older trees and those which have developed heartwood do contain pitch, but these are diverted to other use than papermaking.

Southland Paper Mills, Inc., is located in an area where large sawmills have been operating profitably for years. The president of the South's first newsprint mill, Ernest L. Kurth, also is president of the Angelina County Lumber Company sawmills. Oversized timbers are readily shunted to one side and later used in sawmill operations.

Perpetual Wood Supply

The East Texas newsprint mill is located two miles from Lufkin, a city of some 10,000 inhabitants, the home of several important iron, steel, woodworking and other industries not often found in the pineywoods region.

A little more than one year ago the mill site, covering 300 acres, consisted of the usual Southern cutover pine forest and occasional cotton fields on which tenant farmers eke out an existence. The coming of such a mill to a region which lost its large saw mills about twenty-five years ago when the virgin stands of pine were cut out, is a matter of incalculable importance. It is a step in the direction of balancing Southern farming with industries, which will give employment to farmers and at the same time offer them an outlet for their young pines which hitherto no one wanted.

Surveys of the Lufkin area show that there is a standing supply at present of some 20,000,000 cords of pine pulpwood within a radius of fifty miles of the new paper mill. Since much of this pulpwood is owned by small farmers with less than 100 acres of land it is of direct benefit to a class who needs a new source of cash income.

The loss of foreign cotton markets by Texas and other Southern farmers in recent years and the steady decline of cotton acreage and cotton crop have worked a hardship upon thousands of small farmers who now eagerly turn to the production of pulpwood. Under leadership of the Texas and U. S. Forest Service farmers for several years have been taught how to manage their holdings of pines to conserve the property on a basis of annually or periodically renewable wealth. It has been determined in the case of Southland Mill that a tract of some 110,000 acres of young pines will supply its present demand for pulpwood in perpetuity.

Pines Increase One Cord Per Acre Annually

It has been estimated that East Texas pines increase at the rate of about one cord per acre per year. It also has been established by U. S. Forest Service surveys that the average East Texas acre carries about six cords of pulpwood at present. It is believed that with prevention of fires and some other help to encourage reforestation, natural reproduction of pines will continue indefinitely, since no crop is better adapted to the red, sandy hills of the region than the native pines.

Contrary to general opinion no slash pine grows naturally in East Texas or anywhere in the State.

IMPORTANT DATES IN CONSTRUCTION

December 28, 1938	$6,000,000 contract for construction of Southland Paper Mill at Lufkin awarded to Merritt-Chapman & Scott Corporation of New York City. George F. Hardy, consulting engineer, prepared the plans.
January 14, 1939	Ground broken for mill, officially starting construction.
March 14, 1939	First excavations for building foundations.
March 25, 1939	First concrete poured.
April 17, 1939	First steel framework erected.
May 1, 1939	Brick work began, roofing early part of June. Buildings of reinforced concrete, brick and steel construction with vermiculite concrete roof decks in the paper mill, grinder room and power plant, wolmanized lumber in finishing and shipping rooms and machine shop; all roofs waterproofed and bonded roofing and gravel.
May 27, 1939	Dedication of newsprint mill and unveiling ceremonies of the plaque dedicated to memory of Dr. Charles H. Herty and Francis P. Garvan.
June, 1939	Installation of mill machinery.
December 15, 1939	Warming up process of mill machinery started.
January 15, 1940	Plant taken over as completed from Merritt-Chapman & Scott Corporation, builders.
January 17, 1940	First commercial run of newsprint from mill.
January 26, 1940	Lufkin Daily News printed its Jan. 26th edition on first newsprint made in the new mill for commercial purposes. It was from Roll No. 1.
January 29, 1940 8:30 p.m.	DALLAS NEWS ran off its first papers printed on newsprint made from Texas pine manufactured in the Southland Paper mill at Lufkin. All editions of January 30 were printed on Southland Paper Mills newsprint.

Officers

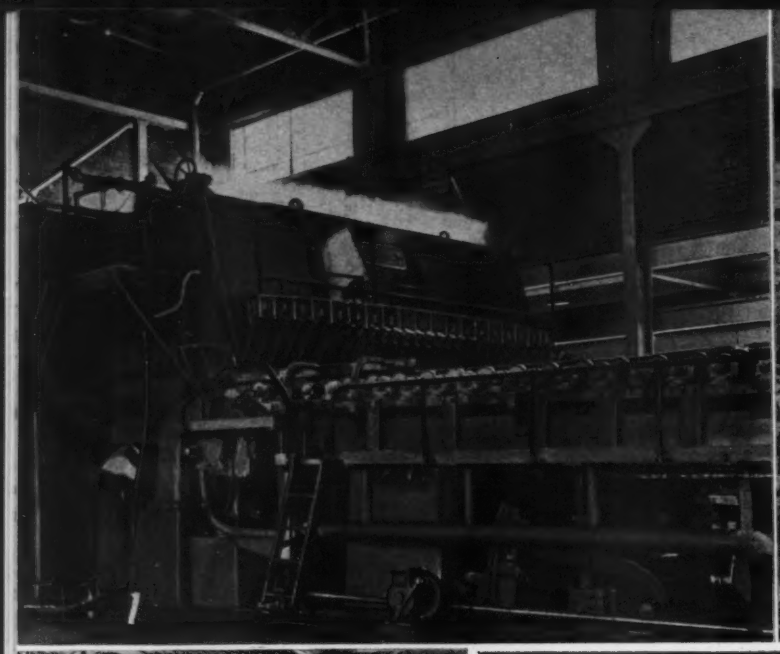
E. L. Kurth, president, Lufkin, Tex.
Arthur Temple, Vice president, Texarkana, Tex.
Albert Newcombe, treasurer, New York, N. Y.
S. W. Henderson, Jr., Sec'y, Lufkin, Tex.

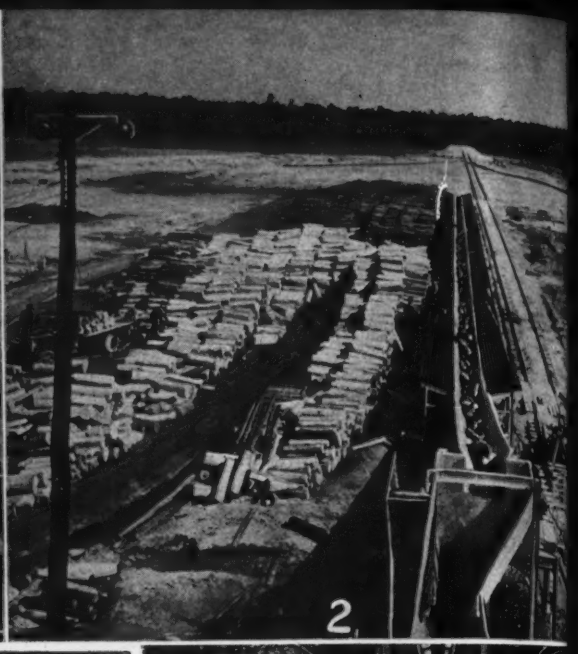
Directors

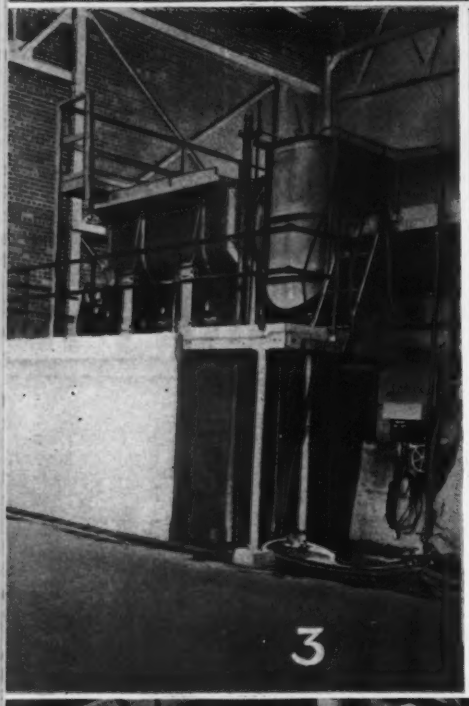
J. H. Kurth, Jr., Houston, Tex.; E. M. (Ted) Dealey, Dallas, Tex.; W. C. Trout, Lufkin, Tex.; Paul Sanderson, Trinity, Tex.; E. K. Gaylord, Oklahoma City, Okla.; Alex F. Weisberg, Dallas, Tex.; E. L. Kurth, Lufkin, Tex.; Arthur Temple, Texarkana, Tex.; Albert Newcombe, New York, N. Y.

Personnel

T. A. Wark, general manager, Lufkin, Tex.
Lloyd G. Schenk, office manager, Lufkin, Tex.
Dr. Charles H. Carpenter, research chemist, Lufkin, Tex.
Norman L. Beaudry, superintendent, Lufkin, Tex.
G. B. Edwards, comptroller, Lufkin, Tex.
Louis Calder, president, Perkins-Goodwin Company, New York, N. Y.
Albert Newcombe, director, Perkins-Goodwin Company, New York, N. Y. and assistant to president.
R. W. Wortham, Jr., associated with Perkins-Goodwin Company, New York, N. Y.

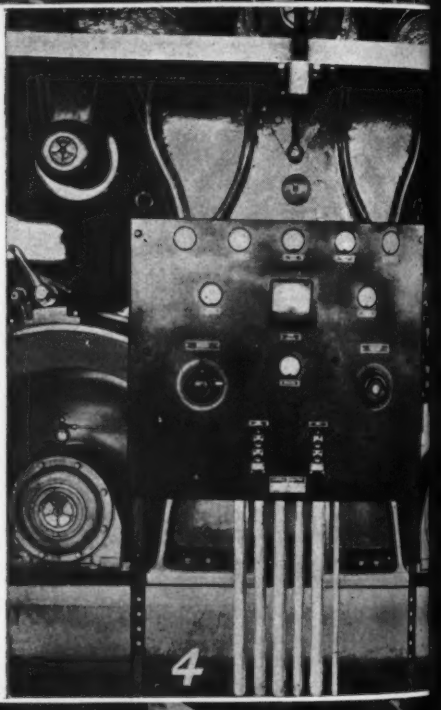


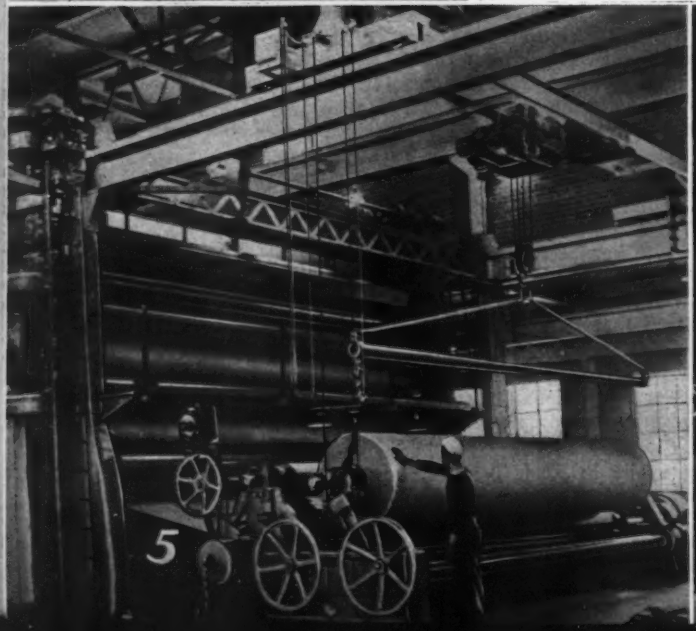




INSTALLATIONS IN MILL OF SOUTHLAND PAPER MILLS INC. LUFKIN, TEXAS

1. Showing Wet End of 234-Inch PUSEY & JONES Fourdrinier.
2. View of Conveyor Operating in Wood Yard.
3. View of 3A Dual Drive BIRD Screens.
4. GENERAL ELECTRIC Sectional Drive Control Panel on Head End of Drier Section.
5. PUSEY & JONES Calender Stack.
6. NASH Pumps Pumping Stock to the Paper Machine.





The error probably traces to constant references in the press to Dr. Herty's researches with slash pine, which happened to be the variety available near Savannah, Ga.

Southland Mills began producing newsprint at the rate of 600 feet a minute, something unusual for any new mill, especially one which is using a revolutionary method and a type of pulpwood which was held long ago to be unsuited to newsprint making. As speed was increased every few days it was found that the optimum rate of operation was at 1250 feet a minute, which seems to suit the pine best.

Beginning of the project for a Southern newsprint mill dates back to an address delivered May 2, 1934, by Major George L. Berry, president of the International Pressmen's Union, before a meeting of the Southern Newspaper Publishers Association at Asheville, N. C. Major Berry's suggestion that a newsprint mill be built in the South caught the imagination of the publishers immediately. A resolution was adopted then and there, authorizing the president of the publishers' association to appoint a committee to investigate the matter.

J. G. Stahlman Heads Committee

A committee was named, headed by James G. Stahlman, publisher of the Nashville, Tenn., *Banner*, and included E. K. Gaylord, publisher of the *Daily Oklahoman*, Oklahoma City, Okla., Clark Howell, Jr. of the Atlanta, Ga., *Constitution*, J. L. Mapes of the Beaumont, Texas, *Enterprise*, now deceased, Curtis B. Johnson of Charlotte, N. C., J. P. Fishburn of Roanoke, Va., V. H. Hanson of Birmingham, Ala., Emanuel Levi of Louisville, Ky., Myron G. Chambers of Knoxville, Tenn.

Later William G. Chandler, general manager of Scripps-Howard newspapers, and John D. Coffin, representing Hearst newspapers, were added to the newsprint committee. E. M. (Ted) Dealey, then vice president of The Dallas *News*, Dallas, Tex., and now its president, was appointed to fill the vacancy caused by Mr. Mapes' death and to represent Texas.

It is largely to the efforts of Mr. Dealey that the mill project has become a reality. It was he who called together a group of Southwestern newspaper publishers who in Dallas on January 11, 1937, pledged themselves to take the entire mill output of 50,000 tons a year for five years at Canadian prices.

At a later date at Biloxi, Miss., in May, 1938, these same publishers subscribed the sum of $425,000 to the mill project fund, which by now was headed by Ernest L. Kurth, prominent Lufkin, Texas, sawmill owner and operator, and who today is president of Southland Mills.

Perkins-Goodwin Co. Interested

Finally, nearly $3,000,000 in notes, real estate, mill site and forest land of 108,000 acres and part ownership in a lumber railroad was raised, after which the Reconstruction Finance Corporation agreed to extend a loan of some $3,000,000. The long established and widely known pulp and paper firm of Perkins-Goodwin Company, New York, were interested in the project. Louis Calder, its president, had been a close friend of Mr. Garvan and Dr. Herty and had been impressed with the possibility of a Southern newsprint industry.

A site near Lufkin, Texas, was selected and a contract awarded to Merritt-Chapman & Scott Corporation of New York, and ground broken on January 14, 1939, by Mr. Kurth with appropriate ceremonies. Excavation started March 14, and from then to when the finished mill was turned over early in January construction work was rapid and frequently ahead of schedule.

One of the favorable arrangements made by Southland Mills is that by which it obtains its 10,000 tons of sulphate kraft pulp from Champion Paper and Fibre Company near Houston, Tex. That company had a mill capacity exceeding its demand and its offer to supply the sulphate pulp saved Southland the cost of installing chemical pulp production equipment. Eventually, however, it is likely that Southland will install the latter if a program of expansion is undertaken, which is deemed likely.

Dr. Carpenter Chief Chemist

Southland Mill maintains a chemical research laboratory headed by Dr. Charles H. Carpenter, who came to the mill from his post as director of the Herty Foundation Laboratory at Savannah, Ga., having succeeded the late Dr. Herty, who died in July, 1938. Dr. Carpenter is a highly trained technician both in forestry and papermaking.

To date the thirty-six newspapers of Texas, Oklahoma, Louisiana and Arkansas, which have subscribed to take the mill's entire output, are well pleased with the paper which is steadily being improved as the paper machine increases its speed to optimum rate of operation which mill technicians have found to be 1250 feet a minute.

It should be said that Southland Mill's output is scarcely one-third of the newsprint consumed in the area which the mill now serves. For this reason the mill, with its present capacity, can not fill the requirements of the subscribing newspapers, which will continue to obtain the remainder of the paper they need from other sources.

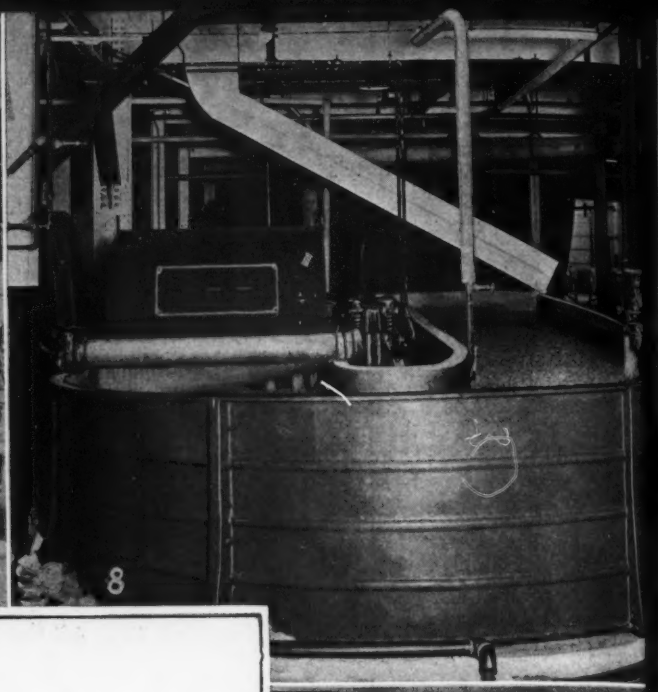
Setting Up of New Techniques

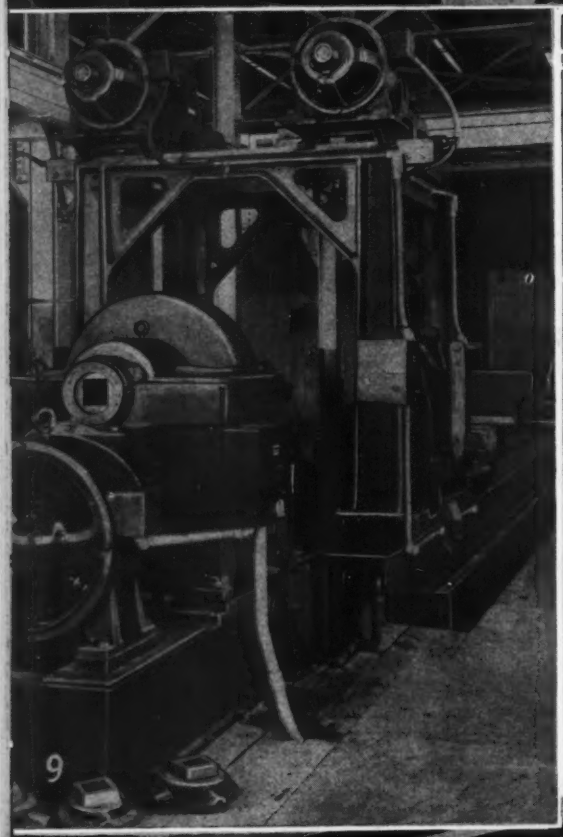
Southland Paper Mills, Inc., in its very name carries a challenge. It is plural, not singular. That may embody implications for the future. The first mill in an entirely new and favorable environment is certain to establish new standards which may call for expansion.

The making of newsprint from Southern pines involves the setting up of entirely new techniques. Something is being done in the East Texas pineywoods which has never been done before. It is no wonder that technicians from Canada and the Northern paper states flocked to the red hills of East Texas to get in on the ground floor of what may be come a great new industry. So many things are happening in this world that one need never be surprised at what might be happening in our own country!

Southland began its commercial operation on January 17, 1940, with its paper machine running at a speed of 600 feet a minute, later tuning up to 1250 feet, which was found to be optimum rate. There was no appreciable trouble from resin or pitch. The thing astonished even the experienced engineers of Southland.

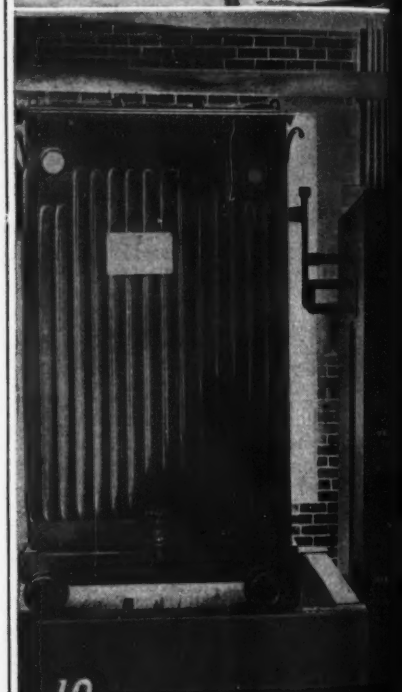
Although somewhat handicapped by lack of having its automatic conveyor system working, which has worked so effectively in recent weeks, Southland Mill got off to a really brilliant start. Since there was no barking drum in operation the bark had to be removed from pulp logs by hand in the woods. The

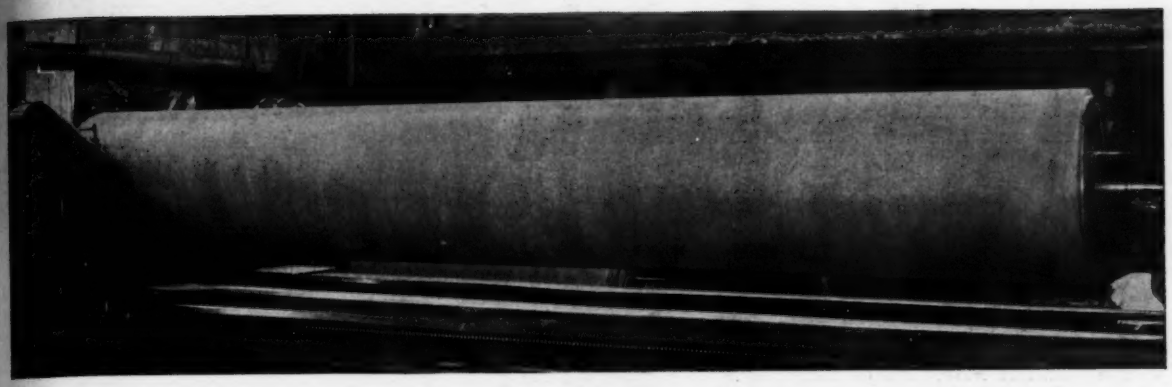




INSTALLATION IN MILL OF SOUTHLAND PAPER MILLS INC. LUFKIN, TEXAS

7. Grinder Room Showing GREAT NORTHERN Grinders.
8. VALLEY IRON WORKS Continuous Beater.
9. RELIANCE Motor Operating FARREL - BIRMINGHAM Roll Grinder.
10. Transformer Supplied by GENERAL ELECTRIC CO.
11. BIRD MACHINE CO. Standard VICKERY Hi-Flex Doctors.
12. RELIANCE Motors on I.M.P. CO. Rotating Pulp Screens.





and now... at SOUTHLAND

Latest addition to the list of Southern mills operating Stowe-Woodward rubber covered rolls is Southland Paper Mills, Inc. The two 36" x 246" suction press rolls on their Puseyjones machine were supplied through the Beloit Iron Works.

Stowe-Woodward rolls are serving the new mills at Jacksonville, Mobile, Fernandina, Port St. Joe, Springhill, Charleston and Georgetown.

STOWE-WOODWARD, INC. NEWTON UPPER FALLS · MASS.

NEW YORK OFFICE · WOOLWORTH BLDG.

Stowe-Woodward Rolls are made on the West Coast by HUNTINGTON RUBBER MILLS, INC., Seattle, Washington

mill is paying for contract wood $4.25 a cord delivered. Farmers living fifty to seventy-five miles away avail themselves of the opportunity to sell young pines for which there had been practically no market up till now. The news that a big paper mill was being completed near Lufkin had spread into the remotest "forks of the creek". Contractors were quick to contact small owners of pine stands and a flow of pulpwood began to fill the ten-acre block set aside as a woodyard.

Motor trucks or railroad cars transport the pulpwood to the mill. Two routes, Southern Pacific Lines and the Cotton Belt Railroad, connect with the mill's own Angelina & Neches River Railroad. Concrete highways lead into all of East Texas from Lufkin and facilitate movement of woodpulp.

The Wood Yard

With arrival of the wood in the mill yard it is fed into a conveyor system made by Jeffrey Manufacturing Company, Columbus, Ohio, having a length of 450 feet before it discharges its cargo into the drum conveyor with a length of 84 feet, all built of structural steel and steel plate trough equipped with C-132 chain and F5 attachments adjusted to handling four-foot wood. This motor-driven apparatus conveys the unbarked logs into the huge barking drum manufactured by Manitowoc Engineering Works at Manitowoc, Wis. Inside measurements of this barking drum are 11 feet by 45 feet, powered with a 125 hp. motor, the drum revolving at 7½ rpm.

The bark, as it is removed from lots of any size, say, from six to twenty-one inches, falls into a bark conveyor which carries it to a pulverizer and blower, the new product of Allington & Curtis Manufacturing Company, Saginaw, from which it is blown into a bark fuel storage chamber in the boiler room. Boiler No. 3 of the three in the mill, is equipped with a bark burning furnace, made by M. A. Hofft Company, Indianapolis, Ind. This furnace is specially designed to consume all bark and waste, converting it into steam and power.

If any of the tough pine bark should happen to adhere to a log the latter is shunted to a conveyor which carries it to the wood cleaning mill where a rosser removes all remaining bark. This machine is the product of H. L. Crouse of Crouseville, Maine.

The knot borer and knot saw equipment removes the pine knots which are likely to contain not only rosin but dirt and rotten wood. All cat faces and other blemishes are removed by a crew of expert workers.

De Zurik Shower Company, Sartell, Minn., built the knot boring machines used at Southland. In the making of newsprint from pines, their use is imperative, because pines frequently have knots filled with rotten wood and dirt, and otherwise show cat faces and perhaps other imperfections.

In order to keep the wood as clean as possible, still further precautions are taken. Each log passes through a high pressure shower of water which then automatically dumps the logs into the wood bins located to the rear and one story above the battery of six grinders.

The Ground Wood Mill

The Montague Machinery Company plant of Turners Falls, N. Y. supplied these Great Northern grinders. Each grinder unit consists of a pair, each independently powered by a special 4,000 hp. synchronous motor manufactured by the Electric Machinery Manufacturing Company, Minneapolis, Minn.

Capacity of each bin is a twenty-four hour supply of wood for the grinders. As one is emptied the other is filled automatically.

Wood from the bin is shunted by a crew of workmen to the conveyor apron which runs the length of the space between the battery of grinders. As each grinder consumes its log, macerating it into the required individual fibers of which paper finally is made, the workers convey the logs to the required chute which then drops them into their respective hopper.

Success in producing satisfactory newsprint from pines is due for the most part to the effectiveness of the grinding process. Therefore, it might be said that the ground wood mill is the very heart of Southland Paper Mill. The six motor-driven double grinder units are fitted with specially constructed pulp stones built to meet the needs of Southland wood pulp, consideration being given to hardness of the varying pines, their content and the presence of grit or other foreign matter. The revolution of these pulpstones has been scientifiically determined.

A constant uniform pressure of the incoming pine logs against the face of the revolving pulpstones is maintained by a "pressure foot", which is controlled by hydraulic cylinders that are a part of each grinder unit. This steady pressure results in the systematic reduction of the log to a mass of fibers whirling in a torrent of water. The mass of pulp and water plunge into a pit under each grinder unit, then passes through concrete troughs in the floor to the four "bull screens", whose job it is to remove tough and large knots, pieces of wood which failed to be ground into pulp, slivers and trash. From here the pulp is carried on over a series of "rifflers" where all silt, grit or sand is settled out, in the ground wood storage tank or stock chest.

Further screening is necessary, however, and the stock is now pumped to the primary and secondary centrifugal screens in the stock preparation room. As the pulp leaves this process its percentage of water is very high and to reduce the consistence of the slush, it is taken to three ground wood vacuum deckers where a certain percentage of water is sucked out and the mass drops into the ground wood storage chest under the deckers. These screens and deckers are manufactured by Improved Paper Machinery Company, Nashua, N. H.

Thickened, the pulp is now pumped through consistency and proportioning regulators in which it is mixed for the first time with the other necessary ingredient of Southland-sulphate pulp.

Bleached Sulphate Pulp from Champion

Southland receives its bleached sulphate pine pulp from the Champion Paper and Fibre Company of Houston since the new mill is not equipped to manufacture it at present. Only 20 per cent of this chemical pulp is mixed with ground pine. This pulp arrives in bales of 450 pounds, each, and contains only 15 to 20 per cent moisture. Automatic electric trucks convey the bales from railroad cars or trucks to the crane that lifts them to the beater room.

Transformation of the dry sulphate pulp into a fluid of pulp and water is accomplished by two Vortex beaters made by Valley Iron Works Company, Appleton, Wis., with a combined capacity of 4,000 pounds.

SOUTHLAND MILLS

Another Milestone for the Southern Paper Industry

and Another Construction Achievement

by

MERRITT-CHAPMAN & SCOTT CORPORATION

On March 14, 1939, actual construction of the Southland Mills was started by Merritt-Chapman & Scott Corporation.

On January 17, 1940, the first newsprint made from southern pine on a commercial basis, came off the paper machine—a crowning achievement to the courage of the organizers, to the skill of the management, to the designing genius of George F. Hardy, Consulting Engineer and to the enterprise of Merritt-Chapman & Scott Corporation.

MERRITT-CHAPMAN & SCOTT CORPORATION

17 BATTERY PLACE 1860 NEW YORK, N.Y.

The remarkable pulp breaking qualities of the Valley Vortex Beater have been partially obscured by emphasis laid upon its fast beating rate. At Southland Paper Mills, Inc., the outstanding breaking capacity of the Valley Vortex is wisely utilized to its fullest extent. Bleached sheet kraft is furnished the beater and is disintegrated as fast as it can be furnished. Then, the stator is lowered and a substantial beating effect is obtained in a short cycle. This is one of the most efficient applications of the Valley Vortex Beater. Another item of Valley Equipment in this mill is the Valley Broke Beater located in the basement beneath the paper machine.

In these beaters the mass is pounded and beaten until the required fineness has been attained. At the completion of this operation the stock drops to an agitated chest in the basement of Southland Mill where further refinement takes place by pumping the stock through a consistency regulator to a normal-size Jordan of the Majestic type made by E. D. Jones & Sons Company of Pittsfield, Mass.

One large Jordan to handle the sulphate pulp and a "baby-sized" Jordan to process ground wood and broke, waste or trim, which is reconverted here into pulp and passed back into the stock chests is sufficient for Southland's needs.

The Paper Machine Room

The stocks having been properly mixed, they are at this stage delivered to the machine stock chest. The three stock chests are all built of tile and are made by Kalamazoo Tank and Silo Company of Kalamazoo, Mich. The stock consistency, regulating and metering system, through which the stock now travels is made by Trimbey Machine Company, Glens Falls, N. Y. This process is electrically synchronized with the speed of the paper machine and to the 8,000 gallon per minute machine fan pump. At this juncture liquid alum is added to the mixture which is mixed by the fan pump at the rate of roughly one pound of fiber to 40 to 50 gallons of water, but varied at different times for different weights and quality of the paper desired. This solution is delivered to the machine head or flow box, so designed that the solution is maintained at a fixedly uniform volume immediately behind the slice, which is adjustable for controlling the volume of flow to the Fourdrinier wire.

Southland's 234 inch Fourdrinier is built by the Pusey & Jones Corporation, Wilmington, Del. The entire paper machine at Southland Mills has a length of about 300 feet. It is painted blue and gray in tribute to the Northern and Southern armies of the war between the states. The huge machine is supported on a Fourdrinier frame and table rolls, adjustable throughout as to pitch of wire and shake for various speeds.

The stock flowing from the lip of the slice, evenly distributed the entire width of the wire, has its fibers uniformly suspended in water. Two-thirds down the length of the wire eight suction boxes beneath the wire, by means of vacuum action by powerful pumps, draw additional water from the sheet. These pumps are by Nash Engineering Company, South Norwalk, Conn. There is a suction couch inside the lower end of the Fourdrinier wire, which removes additional water before delivering the wet, embrionic sheet of paper to the two suction presses, where by means of woolen felts the sheet travels through converging press rolls for further removal of water. Pressure from the top press roll, aided by vacuum suction through the bottom roll hastens the drying process.

As the mass of pine fibers travels rapidly through the dry end of the paper machine, consisting of a smoothing press, it begins rapidly to assume the character of a sheet of paper. There is one 42 inch diameter receiving drier and 48 main driers of 60 inches diameter and five felt driers, arranged in double tier equipped with cotton felted drying surfaces or canvas. As the paper sheet now is rapidly passing through the machine, the top side of the sheet is forced against the face of the bottom driers and the reverse side is next to the face of the top driers.

From now on, uniform steam pressure and heat do the work. The steam within the revolving cylinders condenses and is removed by a forced vapor circulating system installed by the Midwest-Fulton Machine Company, Dayton, Ohio, and is returned to the boiler room to be used over and over.

Special Ventilating System

A specially constructed hood covers the drying end of the paper machine. A special ventilating system throughout the paper machine room keeps the air uniform as to moisture and temperature.

The J. O. Ross Engineering Company, New York supplied the paper machine hood and the ventilating system of the paper room. The paper machine runs entirely on anti-friction bearings.

The sheet of paper, as it leaves the driers, passes through the calender stack consisting of six, sixteen inch, one, twenty-two inch and thirty, four inch chilled iron rolls, operating in anti-friction bearings. These rollers rest upon each other and determine the amount of finish desired on the roll of newsprint. From the calender stack the roll in its entire width of 234 inches enters the winder made by the Cameron Machine Company, Brooklyn, N. Y., with its electrical drive made by General Electric Company, New York, completes the operation by rewinding the sheet during which operation it is slit into the required widths to fit the newspaper presses of the Texas, Oklahoma, Louisiana and Arkansas patrons of the Southland Mill.

As the rolls of paper leave the winder the rolls are covered with heavy protecting wrapping paper and automatically fitted with a roll head bearing the label, "Southland Newsprint". A Delevator conveys the finished rolls to the mill's shipping room in the basement where an electric baby truck takes each roll either to waiting cars for shipment or to a storage room.

The Bird Machine Company has made a particularly fine screen installation in the Southland Mill from the standpoint of both layout and appearance and credit should be given the engineer, George Harvey, for the part he played in developing this efficient screening installation. The entire production is handled by a battery of four large 3A Dual Drive Bird Screens which furnish a continuous supply of clean, uniform stock to the machine wire, permitting maximum speed paper machine operation at low screening cost per ton. This 100 per cent employment of Bird Screens is in line with standard practice for newsprint throughout the world.

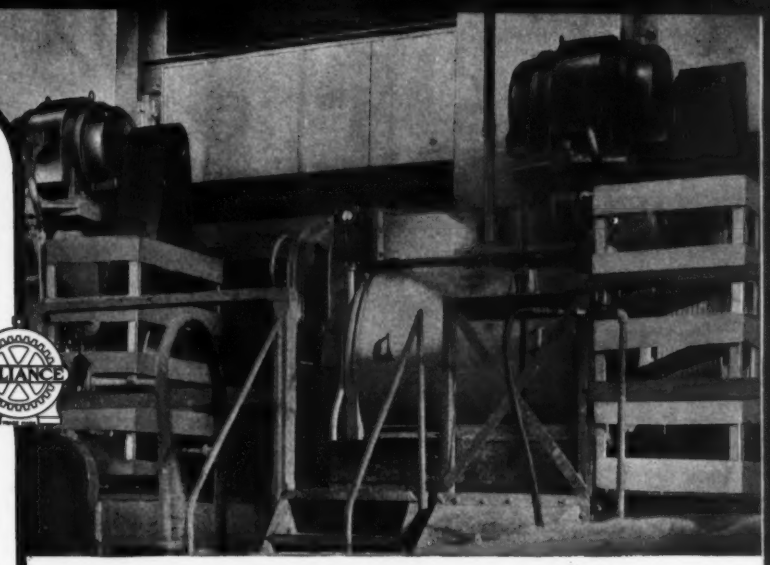
All of the calender rolls in the mill are equipped with Vickery Hi-Flex doctors furnished by the Bird

RELIANCE MOTORS IN THE SOUTHLAND PAPER MILLS

THESE splash-proof motors in the Southland Mills represent a first and important step in *preventive maintenance.* They provide effective protection for motor windings against drip, overflow and splashing. Water, squirted over them at clean-up time can do no harm. Such protection is a money-saver; motors stay on the job longer with better record for steady going.

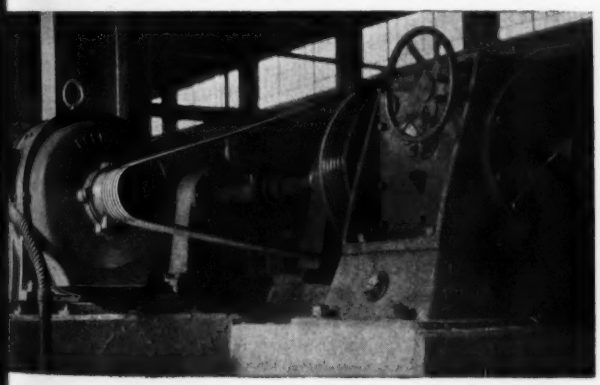
* * *

MOTOR-DRIVE IS MORE THAN POWER

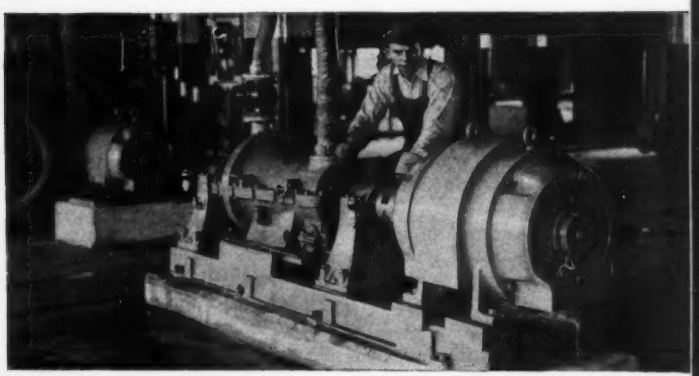


Rotating Pulp Screens driven by 40 hp. 1150 rpm. splash-proof squirrel-cage Reliance Motors.

60 hp. 1755 rpm. motors provide power for these fresh-water twin pumps with a capacity of 1500 gallons a minute. Wells supply up to 10,000,000 gallons of water a day.



Shake head is driven by this adjustable-speed d-c. splash-proof Reliance Motor rated 7½/10 hp. 450-1800 rpm.



"Broke" Jordan driven by 60 hp. 1165 rpm. splash-proof motor.

Vortex Beaters, capacity 2000 pounds each. 150 hp. 1165 rpm. splash-proof squirrel-cage motors.

Reliance Electric & Engineering Co.
1081 Ivanhoe Road Cleveland, Ohio

RELIANCE A-C D-C MOTORS

Birmingham, Boston, Buffalo, Chicago, Cincinnati, Detroit, Greenville (S. C.), Los Angeles, New York, Philadelphia, Pittsburgh, Portland (Ore.), St. Louis, San Francisco, Syracuse (N. Y.), and other principal cities.

Machine Company which may be operated continuously instead of intermittently, eliminating calender marks and keeping the rolls clean and shining. The doctors also permit clearing the stacks and re-threading the paper after breaks, in minimum time.

The Boiler Room

Three large boilers, each producing 76,000 pounds of steam per hour at 650 pounds pressure, provide the power for Southland. Natural gas from nearby gas fields supplies the heat. All boiler water is treated and preheated and pumped to the boilers through boiler feed pumps. Boilers were built by Foster-Wheeler Corporation, New York, whereas equipment for water treatment is supplied by Permutit Company of New York. Worthington Pump and Machinery Company, New York, manufactured the boiler feed pumps, and the control of combustion of the fuel gas is supplied by equipment from Republic Flow Meters Company, New York.

Current of 23,000 volts, is generated by two 6,000 K. W. Turbo-Generators of automatic extraction type with condensers and multi-cubicle switch-board supplied by the General Electric Company. The turbine condensers are constantly cooled as the water circulates through a cooling tower, the product of Christy-Schubert Corporation, New York.

Daily water supply of Southland Paper Mills, Inc. is 10,000,000 gallons of artesian water. It is pumped by five miltiple-stage pumps supplied by Layne-Texas Company, Houston, driven electrically from gravel wall type deep wells located four miles north of the mill. The water is brought to the reservoir and cooling tower through a twenty-four inch bitumastic lined steel fabricated pipe installed by Wyatt Metal and Boiler Works, Houston. Pipe lines vary from twenty to sixteen to twelve and three-fourths inches.

Lufkin Foundry and Machine Company provided all welding and pipe fittings while valves were from Reading Pratt & Cady Division of American Chain and Cable Company, Inc., Bridgeport, Conn.

Farrel-Birmingham, Ansonia, Conn. installed the latest type of roll grinder.

Reliance Electric and Engineering Company, Cleveland, Ohio, among other motors furnished an adjustable-speed d.-c. splash-proof motor for the shake head, splash-proof squirrel-cage motors for the Vortex beaters, splash-proof squirrel-cage motors for the rotating pulp screens, splash-proof motors for the broke Jordan and motors for the fresh-water twin pumps.

Automatic sprinkling system and automatic telephone and code call system direct to Lufkin Central Station provide up-to-date protection with automatic fire alarms in strategic parts of the mill and on the grounds.

A specially constructed brick building at the entrance houses the personnel, time keeping and first aid departments. Modern shower and locker rooms are provided for mill employees.

Southland Mills covers approximately 240 acres. More than seven acres constitute the mill proper and mill yard. Mosher Steel Company, Houston, supplied the fabricated steel of which the framework of the mill is built. Brick and cement for the walls and floors were supplied by Acme Brick Company, Fort Worth, Texas.

The new mill is said to be one of the most modern and completely equipped in the nation.

Finland May Lose 13 Mills

Although the actual loss of the pulp and paper capacity to Finland resulting in the peace treaty of that country with Russia is not actually known at this date it is believed to be considerable. The territory involved includes the Karelian Isthmus and a part of the area bordering on Lake Lodoga. The isthmus is the center of the Finnish export trade and includes paper and pulp mills, metal works and lumber mills.

According to the American Paper and Pulp Association preliminary advice from the Department of Commerce, Washington, D. C., indicates that the territory includes 13 pulp mills. These 13 mills constitute about 19 per cent of Finland's pulp capacity, which amounts to 392,000 tons. Based on the total of the Finnish pulp capacity, this amounts to 27 per cent of the sulphite, 22 per cent of the sulphate, and 4 per cent of the groundwood capacities, respectively. Additionally, this involves a production of 125,000 tons of newsprint, 37,000 tons of paperboard, and 32,500 tons of other paper products.

Since the pulp mills in this area produce largely for export trade, the loss of this tonnage will undoubtedly be felt in world markets. The Department of Commerce indicates that Russian pulp production will be kept for their own use due to domestic shortages in that country.

If the railroad running from Sinola to Elisenvaara, is taken over by Russia, and it appears that it will be taken over, transportation facilities for any Finnish owned mills in the territory may be lost. It is probable that the seizure of the entire network of railroads in the territory is the Russian objective since this would, together with ownership of the port of Viipuri, afford Russia an economic stranglehold upon the entire territory.

Further indications are that the important power development at Matra and Vallinkoski will remain in Finnish hands but will be called upon to serve the Russian owned industries.

British Columbia Mills Busy

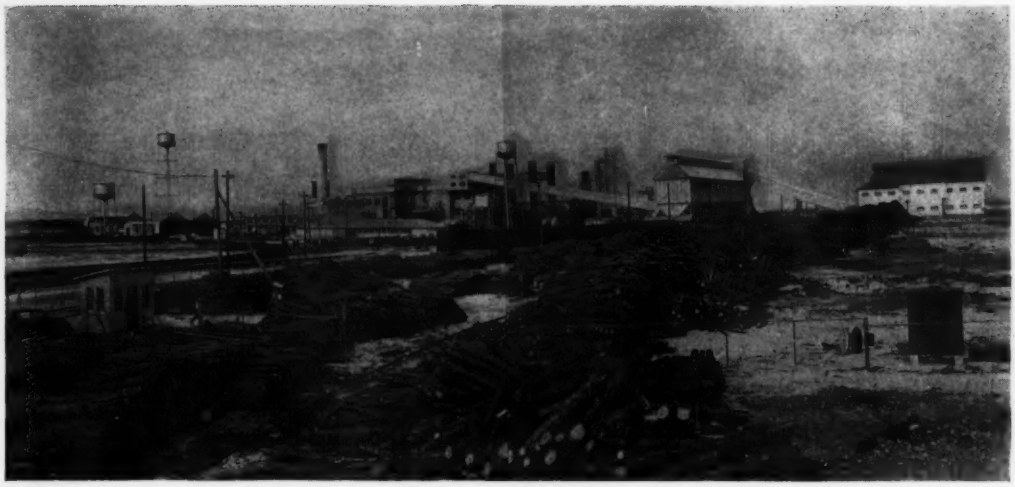
VANCOUVER, B. C., March 16, 1940—British Columbia's pulp and paper industry is stepping into high gear with every plant working full time and one on a 24-hour basis. This is in sharp contrast with last year when some plants were closed down entirely and others operated with skeleton shifts.

Provincial forestry officials announced that plants at Port Alice, Powell River, Woodfibre and reconverting plants were operating on full time, while the Ocean Falls plant, largest in the province, is working three eight-hour shifts daily seven days a week.

Improvement in exchange rate factors, interruption in Scandinavian deliveries, delays due to conditions in Europe, and firm newsprint prices have contributed to the improved outlook for the industry.

Since last November the Ocean Falls plant has been operating 24 hours a day; Powell River has been on full time; Woodfibre reopened with increased capacity, and all secondary and reconverting plants have speeded up on a full-time basis. The increased output affects high-grade raw pulp, newsprint and pulp and paper stocks generally.

While production figures are not yet available forestry officials said a 700 per cent gain in output has been reported from some divisions of the pulpwood section of the forest products industry.



Rayonier Incorporated

Fernandina, Fla.

Rayonier, Inc., early in January of this year announced the opening of its pulp mill at Fernandina, Fla. for the manufacture of bleached sulphite pulp for paper and rayon purposes. This marked an important era in the history of the manufacture of pulp and paper in the South as it was the first time that bleached sulphite pulp in commercial quantities was manufactured from Southern pine. Rayonier developed the process used in its research laboratories and spent about $8,000,000 in establishing the new plant, acquiring the site and surrounding timber lands. When the plant is fully in operation it will have an annual capacity of 64,000 tons, increasing the company's total output to more than 300,000 tons annually.

The Rust Engineering Company, Clark Building, Pittsburgh, Pa., had the general erection contract. Construction on the new mill was started late in the summer of 1937, but the mill was not placed in operation as soon as originally planned because of adverse economic conditions.

Unusually Favorable Location

Fernandina is an unusually favorable location for a mill of this particular type. This city was selected as the site for the plant because of the following reasons: 1—Abundance of pulpwood which is particularly adapted to the process involved; 2—Ample water for processing; 3—Favorable situation for the disposal of waste; 4—Adequate transportation by rail, water and highway for the assembly of materials and shipments to consuming markets; 5—Favorable labor market; 6—Tax exemption under Florida laws; 7—Excellent climate and recreational facilities of Fernandina; 8—Suitable site on Amelia River; 9—Whole-hearted cooperation of the city manager, O. H. Anderson, whose efforts in behalf of Fernandina were responsible for securing the plant at that point. The site for the new mill comprises 175 acres fronting 2,000 feet on Amelia River, Fernandina's harbor. The site is served by Seaboard Air Line Railway. The wood supply in the surrounding territory is considered ample for two mills.

The field of wood cellulose utilization has been widely expanded in recent years to include the production of a great variety of commercial products; and in view of the South's enormous forest resources, the value to this section of the new mill at Fernandina cannot be readily calculated.

Most Thoroughly Modern

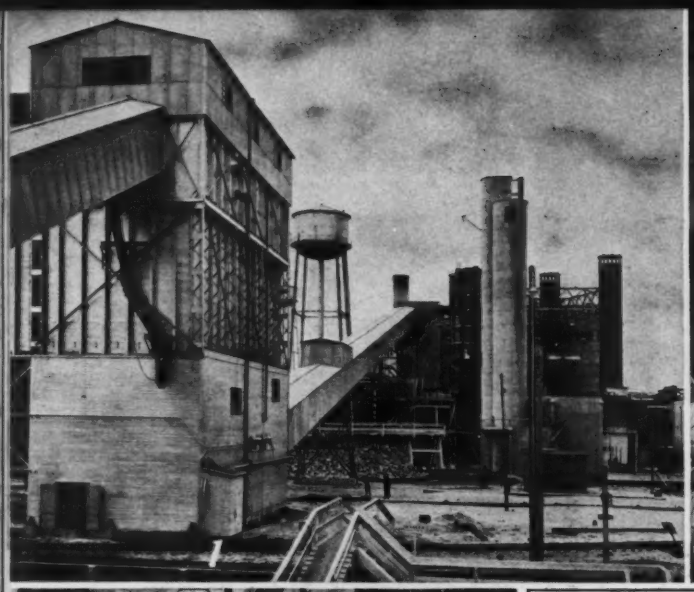
The new bleached sulphite pulp mill of Rayonier, Inc. at Fernandina is said to be one of the most thoroughly modern of its type.

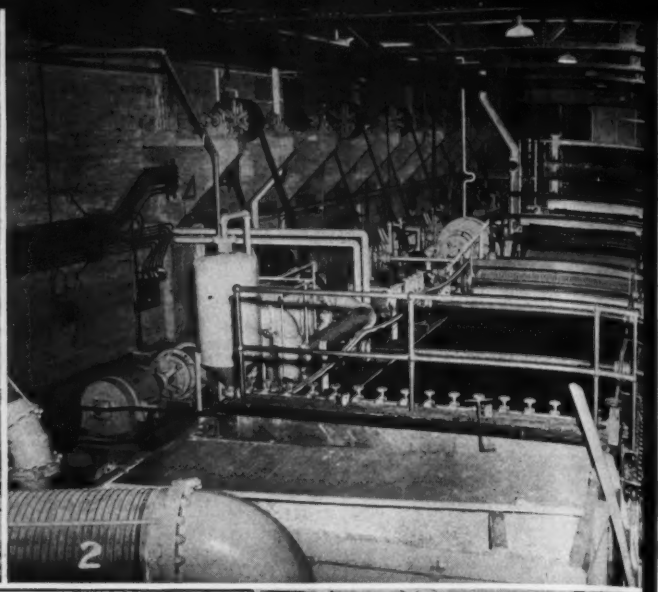
When the mill was originally started it was known as the Fernandina Pulp and Paper Company, organized by interests associated with Rainier Pulp and Paper Company, Grays Harbor Pulp and Paper Company and Olympic Forest Products Company, but this name was later changed to Rayonier, Inc., being the Fernandina branch of a group of mills being operated under that name on the Pacific coast with executive offices at 343 Sansome street, San Francisco, Cal. and sales offices at 122 East 42nd street, New York, N. Y. The following are the officers of the company: Edward M. Mills, president; J. D. Zellerbach, executive vice-president; Charles H. Conrad, secretary and treasurer; L. G. Wilson, comptroller; D. B. Davis, general manager; E. T. Kline, operating manager, Fernandina; R. M. Pickens and A. N. Parrett, research and technical directors, Shelton, Wash.; H. E. Kerry, traffic manager; J. D. Sullivan, purchasing agent, 719 White Building, Seattle, Wash.

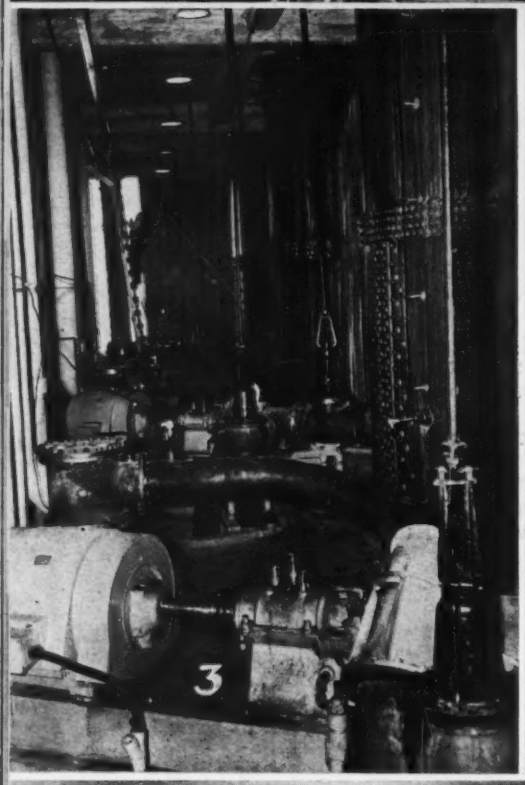
Sub-Contractors and Manufacturers of the Principal Equipment

The following were the contractors and manufacturers of the principal equipment installed in the mill:

Construction, Rust Engineering Company, Pittsburgh, Pa.

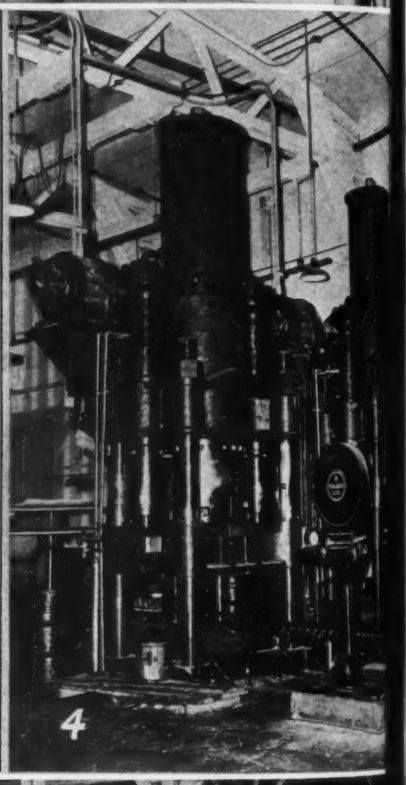


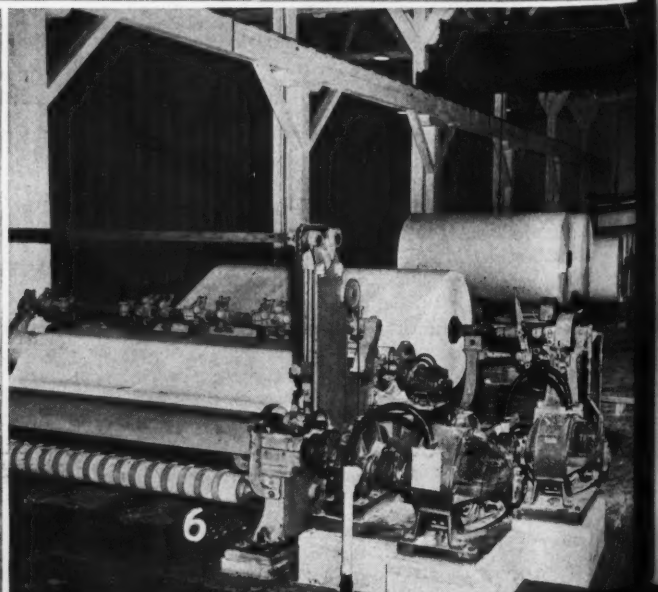




INSTALLATIONS IN MILL OF RAYONIER INCORPORATED FERNANDINA, FLA.

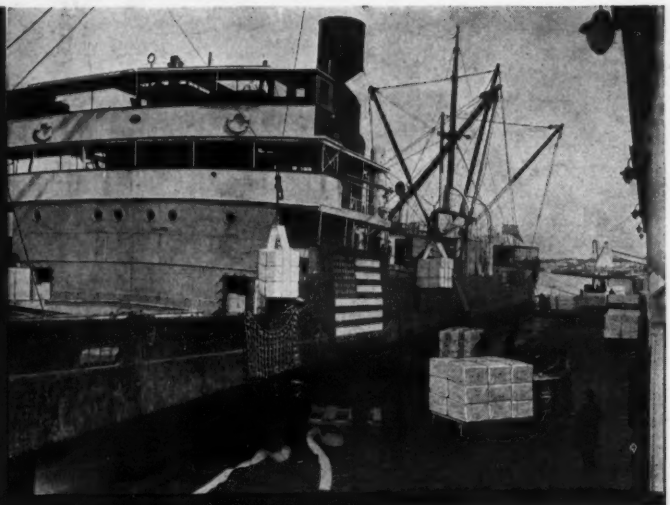
1. Chip Storage Building, Digester Plant.
2. RICE, BARTON & FALES Fourdrinier.
3. Digester Plant, Circulating Pumps and Motors.
4. Two BALDWIN SOUTHWARK 800-Ton Presses and TOLEDO Scale.
5. ELWELL-PARKER Electric Stacker Operating on Dock.
6. BLACK CLAWSON Rewinder.





ELWELL-PARKER TRUCKS

Were Purchased for the South's First Bleached Sulphite Mill Because—



—other Elwell-Parkers had reduced costs for years in West Coast Mills under the same Ownership!

A long 3,000 miles separates the Pulp Mills of a large Company on the West Coast from the new, modern Plant of Rayonier, Inc., at Fernandina, Florida, under the same ownership and management.

At Fernandina, 6 powerful Elwell-Parker Electric Trucks transport wood pulp on skids from mill to shipside and boxcars. They were the logical choice, because other Elwell-Parkers have been in operation for years at the Pulp Company's Coast plant, where their value in reducing costs has been demonstrated daily.

The Florida Mill is the first in the South to *manufacture* bleached sulphite wood pulp from Southern pine —Elwell-Parker Trucks are the first to *transport* it.

The project is indeed a tribute to the vision and resourcefulness of the men who built it.

Elwell-Parker built some of the first Trucks *ever used* to transport paper and pulp. Today, red-lettering our 34th year, we are supplying modern, newly-designed Roll-Handling Trucks of increased capacity, both Center Control and Rear Control types; and Cranes and Trucks for transporting and tiering pulp, bales of waste, etc.

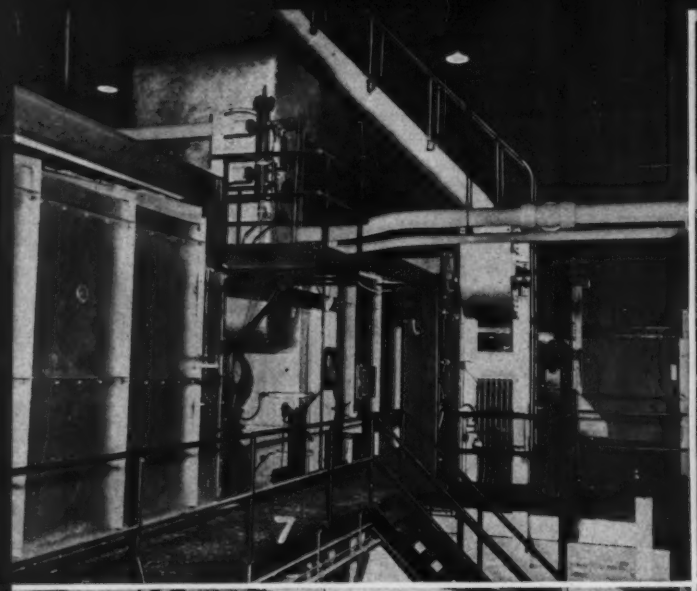
Send for a Representative to survey your plant and show how you can create new savings with a *System* of these up-to-date Elwell-Parkers. Wire *collect*—and remember:—

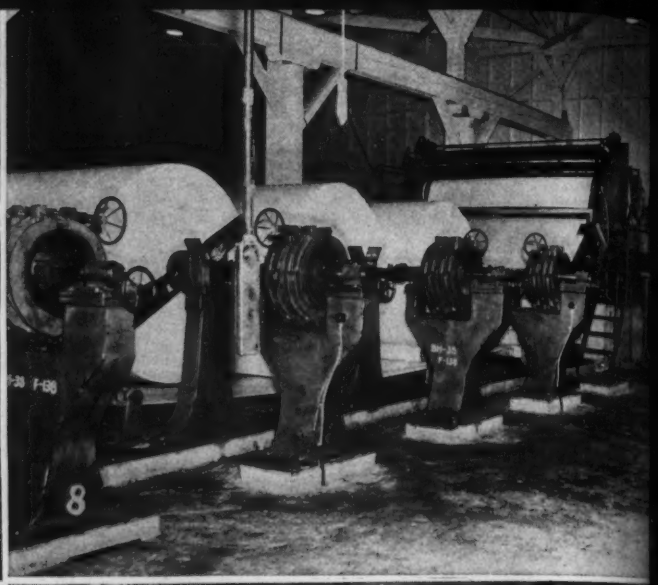
90% of all Elwell-Parker Electric Trucks built since 1906 are still on the job!

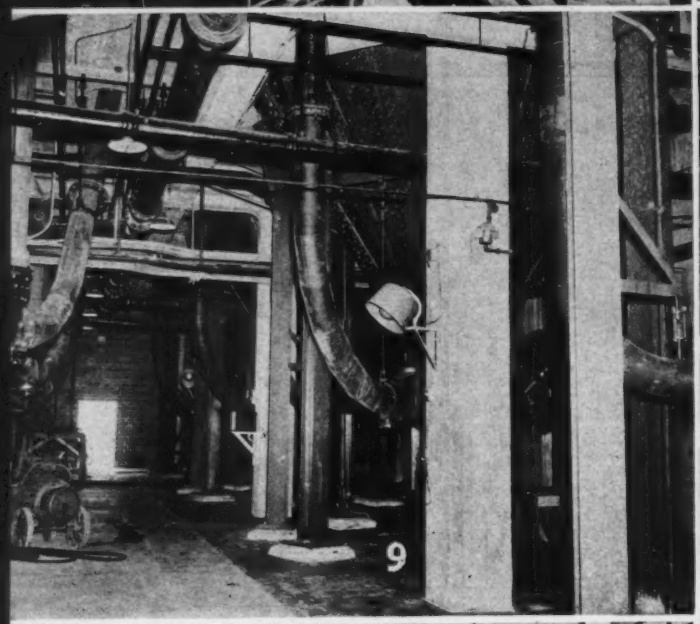
The Elwell-Parker Electric Company, 4500 St. Clair Avenue, Cleveland, Ohio.

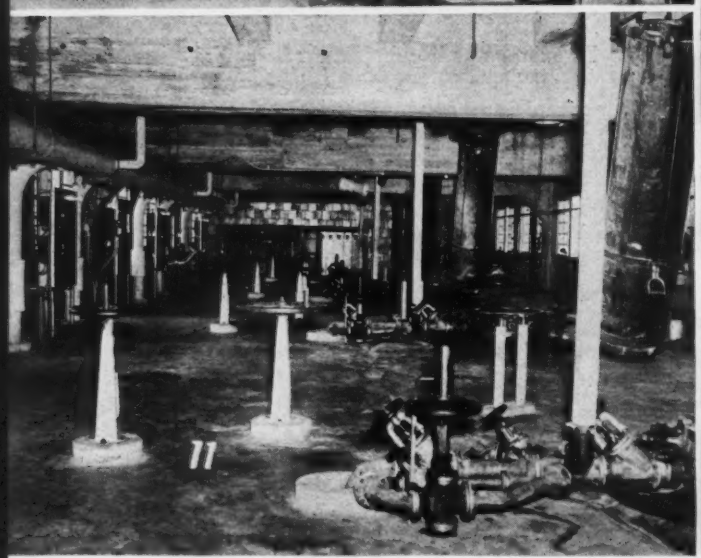
ELWELL-PARKER *Power Industrial* TRUCKS

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906









INSTALLATIONS IN MILL OF RAYONIER INCORPORATED, FERNANDINA, FLA.

For Legends See Page 32

Remember Their Name
You'll Never Forget Their Service

Fernandina, Florida, is the
Rayonier Plant to Use . . .

MOLINE FLIGHT CONVEYORS

● Selection by the Rayonier Company, for the Fernandina Plant, of 4 Moline Flight Conveyors having 220 foot, 360 foot, 370 foot, and 485 foot centers respectively, for handling pulp logs ranging from 4 inches to 14 inches in diameter, and 5 feet long, is undisputable evidence of the efficient and satisfactory performance of the Moline Flight Conveyors in four other Rayonier mills.

Designed with long link chains which are stronger pound for pound than equivalent sizes of "pin type" chain —flights that link integrally into the strand instead of merely fastening onto the chain, and many other proven and exclusive features available nowhere else — Moline Flight Conveyors regularly save 25% to 50% of first cost, 15% to 30% of power requirements and provide 15% to 25% greater capacity than other conveyors when handling pulp logs—and hog fuel, slabs, saw dust, etc. (Proof of these claims furnished on request.)

Investigate the savings you can make by using in your mill these conveyors that cost less, operate cheaper, yet carry more. A descriptive catalog giving full details, a list of typical users, and other information, is available on request. No obligation. Send the coupon for a catalog today.

MOLINE MALLEABLE IRON CO.
ST. CHARLES, ILLINOIS
626 Race Street, Philadelphia, Pa. 668 E. 11th St., Tacoma, Wash.

MOLINE
FLIGHT CONVEYORS

MOLINE MALLEABLE IRON CO.
626 Race St., Philadelphia, Pa. | ST. CHARLES, ILLINOIS | 668 E. 11th St., Tacoma, Wash.

Gentlemen: Without obligating me in any way, please send the illustrated catalog describing Moline Flight Conveyors.

Name _____ Title _____

Company Name _____

Address _____

(9)

Barking Drum, Fiber Making Processes, Inc., Chicago, Ill.

Chipper, Sumner Iron Works, Chicago, Ill.

Digesters, Bethlehem Steel Company, Bethlehem, Pa.

Digester Circulating and Blow System, Electric Steel Foundry Company, Portland, Ore.

Pulp Washer, Improved Paper Machine Company, Nashua, N. H.

Screen Equipment, Bagley & Sewell Company, Watertown, N. Y.

Blow Pit, National Tank and Pipe Company, Portland, Ore.

Steel Tanks, Chicago Bridge and Iron Works, Chicago, Ill.

Bleaching Plant, Pulp Bleaching Corporation, Wausau, Wis.

Pumps, Ingersoll Rand, Phillipsburg, N. J. and Bingham Pump Company, Portland, Ore.

Fourdrinier Pulp-Drying Machine, Rice, Barton & Fales, Inc., Worcester, Mass.

Vacuum Pumps, Nash Engineering Company, South Norwalk, Conn.

Press Rolls, Stowe-Woodward Inc., Newton Upper Falls, Mass.

Ventilating Equipment, J. O. Ross Engineering Corporation, New York, N. Y.

Pulp Press, Baldwin-Southwark Corporation, Philadelphia, Pa.

Boilers, the Babcock & Wilcox Company, New York, N. Y.

Condenser and Auxiliaries, Elliott Company, Jeannette, Pa.

Combustion Control, Bailey Meter Company, Cleveland, Ohio.

Blowers, Buffalo Forge Company, Buffalo, N. Y.

Turbine and Drive, General Electric Company, Schenectady, N. Y.

Main Switchboard, Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

Lubricating System, S. F. Bowser & Co., Ft. Wayne, Ind.

Insulation, Standard Asbestos Manufacturing Company, Fire Brick, General Refractories Company, Philadelphia, Pa.

Dredging, the Arundell Company, Baltimore, Md.

Foundation Piles, Merritt, Chapman & Scott, New York, N. Y.

Dock, George B. Auchter, Jacksonville, Fla.

Water Wells, Layne Atlantic Company, Norfolk, Va.

Conveyors, Pioneer Rubber Company, and Dodge Manufacturing Company, Mishawaka, Ind.

Plumbing, The Grinnell Company.

Cranes, Ohio Crane Company, Bucyrus, Ohio.

Fencing, Stewart Iron Works Company, Installed by J. G. Christopher Company of Jacksonville, Fla.

Cutter, Lamb Grays Harbor Company.

Scales, Toledo Scale Company, Toledo, Ohio.

Electric Trucks, Stackers and Car Loaders, Elwell Parker Company, Cleveland, Ohio.

LEGENDS FOR INSTALLATIONS IN MILL OF RAYONIER, INC. FERNANDINA, FLA. ON PAGE 30

7. BABCOCK & WILCOX Boilers.
8. LAMB GRAYS HARBOR Cutter and Automatic Layboy.
9. Bottom View of Three Digesters.
10. End View of Bleach Plant Operating Floor.
11. Four 25 Ton Digesters with Chip Spouts.
12. PERMUTIT Water Softening Equipment.

Paper Industry Committee Meets

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 20, 1940—Paper Industry Committee, appointed by the Hour and Wage Division of the Department of Labor, began meetings here on Monday to investigate economic and competitive conditions in the paper and pulp industry, with an idea of recommending minimum wages under the Wages and Hours Law. John A. Lapp, of Chicago, publicist and educator, is chairman of the committee.

It has been estimated that between 10,000 and 12,000 paper industry workers are paid less than 40 cents an hour, the highest minimum the committee can recommend.

Following the preliminary meeting held this week, members of the committee will make a study of the information they received, following which the committee will make its recommendation for minimum wages to the administrator. At a future date, the administrator will set a time for further hearing when witnesses will be put on the stand and cross-examined. Following this, the administrator will make his own recommendation for minimum wages, having in mind the Industry Committee's recommendation.

Change Name to Anderson Paper Co.

KALAMAZOO, Mich., March 20, 1940—At the annual meeting of the stockholders of the Cardinal Paper Company, it was decided to change the name of the Cardinal Paper Company to Anderson Paper Company.

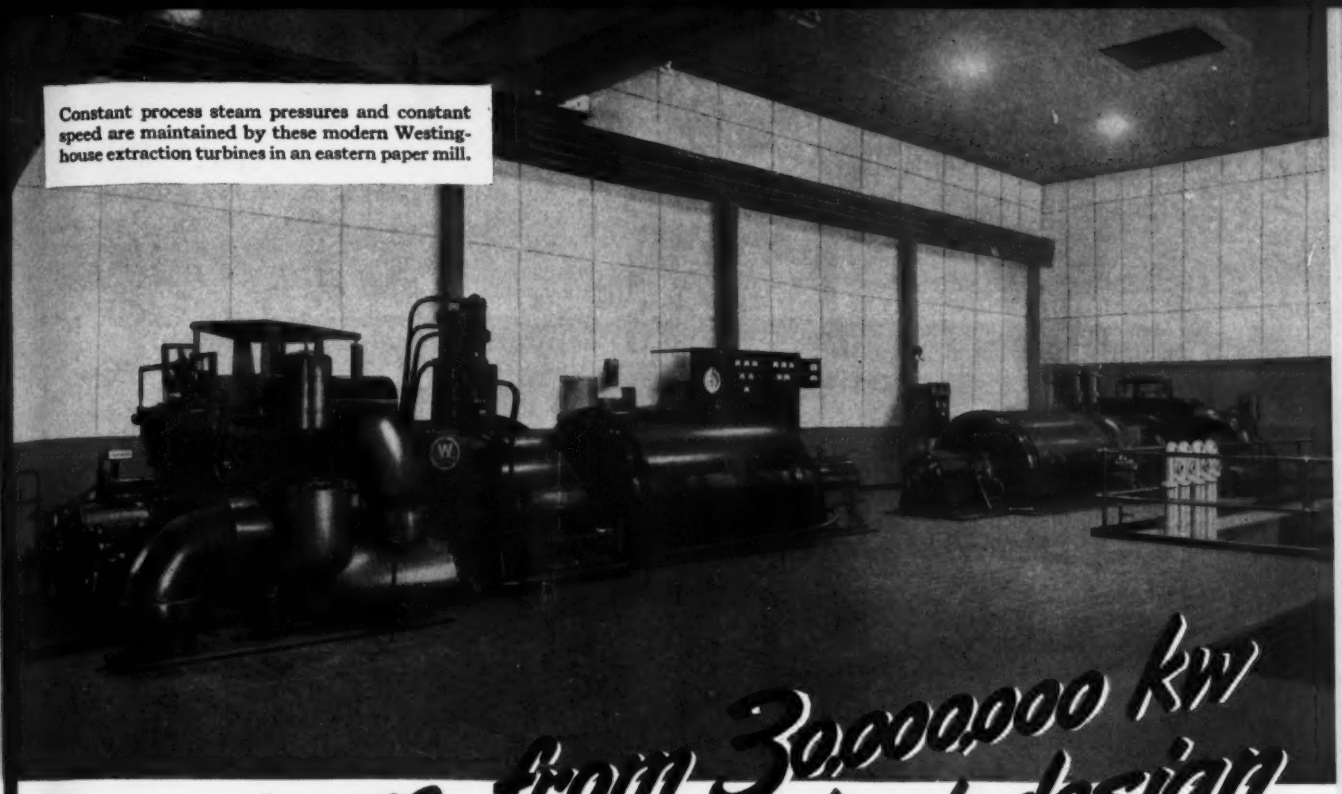
This change was made to form a closer tie between the management of the business and the name of the concern.

Although there have been no changes in personnel, management or policies of the concern, the stockholders elected a new board of directors as follows: President, Mrs. Grace G. Upjohn; vice president, Donald T. Anderson; treasurer, Neil B. Abrams; secretary and general manager, Robert H. Anderson.

A. G. Bellis Heads J. P. Heilbronn Co.

The business of the J. P. Heilbronn Company, Inc., of Manila, P. I. will be carried on as in the past, and the policies inaugurated by the company's late president and founder, Joseph P. Heilbronn, will be followed by the present officers of the company.

Amos G. Bellis, who has been associated with Mr. Heilbronn since the company's inception on July 1, 1909, has been elected president, and will continue his duties as treasurer and general manager and John R. Carmichael has been elected vice president, and continues as secretary and assistant manager. Mrs. Joseph P. Heilbronn, sole executrix of the estate of J. P. Heilbronn, remains a member of the board of directors.



Constant process steam pressures and constant speed are maintained by these modern Westinghouse extraction turbines in an eastern paper mill.

Experience from 30,000,000 kw behind your power plant design

STARTING WITH FIRST COMMERCIALLY PRACTICAL TURBINE IN AMERICA, IN 1899, WESTINGHOUSE HAS BUILT ENOUGH CAPACITY TO SUPPLY ONE-THIRD OF TODAY'S STEAM GENERATED POWER

HE INTERPRETS YOUR NEEDS TO US...

Whether it's a push button control you are buying, or a power-saving capacitor, your Westinghouse salesman brings you the ability of a group of engineers skilled in supplying practical and economical solution to power problems. They will help you select and apply electrical equipment most profitably.

WHEN you install a Westinghouse turbine—for your main power plant or for paper machine drive—you gain the benefit of an experience matched by no other manufacturer. The improved efficiencies of today's steam turbines, their economy in fuel and space, and close regulation are largely the result of Westinghouse developments.

This march of progress displays itself throughout all Westinghouse equipment for the paper industry. For instance, compare today's sectional drives with the first American installation (also by Westinghouse) in 1910—and you will find tangible evidence of Westinghouse engineering skill.

This ability to match mechanical improvements with electrical equipment constitutes a sound reason for relying upon Westinghouse. And another, is the fast, capable action obtainable from your near-by Westinghouse office.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH, PA.

J-94261

Westinghouse

ELECTRICAL PARTNER OF THE PULP AND PAPER INDUSTRY

Obituary

Robert H. Stobie

HOOKSETT, N. H., March 14, 1940—Robert H. Stobie, 54, at one time superintendent of the plant of Hollingsworth & Whitney Company at Madison, Me., and superintendent of the Waterville, Me., branch of the company, died March 14 at the Margaret Pillsbury Hospital in Concord, after a month's illness.

He was known to thousands of sportsmen because of his position as director of the New Hampshire fish and game department for the past five years. He was former trap-shooting champion of Maine and New Hampshire and had served in the New Hampshire Legislature from 1933 to 1935.

The flag on the State House at Concord was lowered to half-staff March 14 and remained there until after funeral services in St. Paul's Church, Concord, March 17 at 2 P.M.

Mr. Stobie was born in Garbridge, Scotland, the son of William H. and Martha (Horne) Stobie. His brother George Stobie, has been head of the Maine state fish and game department for more than 10 years. Mr. Stobie moved to Winslow, Me., at the age of 7. He had attended Colburn Institute and Morgan Business College at Waterville, and taught penmanship at the latter school for a year.

Before his appointment five years ago, Mr. Stobie was an active outdoor enthusiast, and for many years his farm here was the scene for the annual fall field trials of the Fox, Coon and Rabbit Hunters' Association, and the field trials for bird dogs.

Mr. Stobie leaves his widow, the former Ann Pitts; his mother; two daughters, Mrs. Gordon Van Buskirk of Woodbridge, Ct., and Miss Marie Stobie; a son, William Stobie of Hooksett; two brothers, George and John Stobie; and a sister, Mrs. Florence Woodward of Leroy, N. Y.

Gerald H. Davidson

Gerald H. Davidson died last December near Hopedale, Labrador in an airplane crash.

He, together with two companions, left Moisie, Que., on a flight to North West River, Labrador, to survey timber limits in which he was interested.

Apparently losing their direction, due to unfavorable flying weather, they ran out of gasoline and were forced to land about 150 miles north of their objective.

Numerous search planes failed to locate them and on March 1 word was received that their bodies had been discovered by a trapper making his annual visit to that locality.

Mr. Davidson was born in Ottawa in 1890, educated at Ottawa Collegiate Institute and McGill University. He went overseas in 1914 with the 5th Battery, Canadian Field Artillery. In 1916 he was granted a commission and appointed to the command of a battery in the 3rd Divisional Trench Mortars. He was later appointed 4th Division Trench Mortar officer upon organization of that Division.

At Passchendale in 1916, he was awarded the Military Cross and mentioned in despatches.

After the war, Mr. Davidson managed the Eastern Pulp and Paper Company plant at Madeleine River, and later organized and managed the St. Lawrence Paper Companys plant at Trinity Bay.

In 1930 Mr. Davidson joined the firm of McFarlane Son & Hodgson (Limited) wholesale stationers and paper merchants of Montreal, Canada, as director and secretary.

He is survived by his widow, a daughter of Clement H. McFarlane, President of McFarlane Son & Hodgson (Limited), and four children.

James Kellett

NEENAH, Wis., March 18, 1940—James Kellett, 40, who was in charge of the maintenance department of the Kimberly-Clark Corporation's mill at Niagara Falls, N. Y., died March 14 at Niagara Falls after a brief illness with heart disease.

Mr. Kellett was a native of Neenah and had worked for the corporation for the last eight years. He was transferred to Niagara Falls five years ago. Previous to that time he was associated with the Hewitt Machine Company, makers of paper mill machinery at Neenah.

The body was conveyed to Neenah, where funeral services were held Sunday afternoon, with the Rev. A. A. Chambers, rector of St. Thomas Episcopal Church, in charge. Services at the grave at Oak Hill cemetery were conducted by Kane Lodge, F. & A. M., of which Mr. Kellett was a past master.

Survivors are the widow; a son, James, Jr.; a daughter, Jean, and his mother, Mrs. Walter Kellett, Neenah.

Thomas F. Sullivan

KALAMAZOO, Mich., March 11, 1940—Thomas F. Sullivan, executive vice-president of the Monroe Paper Products Company, Monroe, Mich., died of a cerebral hemorrhage in a hospital at Lake City, Florida, on March 8.

Accompanied by three of his friends the party was enroute to Tampa by auto when Mr. Sullivan was stricken. Funeral services were held in Monroe. Mrs. Sullivan died in September 1939. A brother Joseph of Monroe survives him.

Samuel W. Simpson

KALAMAZOO, Mich., March 14, 1940—Samuel W. Simpson, 80, vice-president of the Mac-Sim-Bar Paper Company, Otsego, Michigan, died in that city on March 12 following a week's illness. Mr. Simpson was for many years an official with the Bardeen Paper Company until its merger with the allied paper mills of Kalamazoo. In 1905, together with George Bardeen and M. B. McClelland they organized the Mac-Sim-Bar Company, having served with that company as an executive until his death. He is survived by three sons, one daughter, several grandchildren and a brother. He held life membership in the Masonic and Knights of Pythias orders. Burial was at Otsego.

Joseph E. Brown

KALAMAZOO, Mich., Mar. 14, 1940—Joseph E. Brown, 74, vice-president of the Bryant Paper Company, died at his home in Kalamazoo on March 13, 1940 of a heart ailment. Mr. Brown had resided in Kalamazoo 37 years during which time he was one

of the city's prominent industrialists, at the time of his death being an executive in six local companies, in addition to the Bryant. Born in Canton, Georgia, he was a member of a family long identified with the political and social history of that State.

His wife, Constance Reed Brown, daughter of H. C. Reed, who was one of the organizers of the Bryant Paper Company, preceded him in death in September, 1939. He was a former president of the Kalamazoo country club, Gull Lake country club and the Park club. One of his hobbies was golf at which he was an expert. He was endowed with a genial nature, his keen wit and sense of humor marking him among his associates. He is survived by his sister, Mrs. George B. DuBois of Chevy Chase, Md., and a number of nieces and nephews. Burial was in Kalamazoo.

Ellsworth H. Hults

Ellsworth H. Hults, 67, retired head of a paper concern which bore his name, died during the week at his home 256 High street, Germantown, Pa. After graduating from the old Manual Training School here Mr. Hults entered the University of Pennsylvania in the class of 1891. He was a Mason.

Surviving him are his widow, Adele T. and five sons, Ellsworth J., 3d, James T., Frederic T., Robert M., all of Philadelphia, and Arthur N., of Charleston, N. C.

Dr. Karlson May Go to Savannah

[FROM OUR REGULAR CORRESPONDENT]

HUDSON FALLS, N. Y., March 18, 1940—Announcement is made that Dr. Karl R. Karlson, general manager of the Union Bag and Paper Corporation for the past few years, is slated to be transferred in the near future to the Savannah, Ga., plant where he will hold an executive position. When the Kaukauna, Wis., plant was discontinued several years ago he was transferred to this village as resident manager. Lawrence T. Ross, of Glens Falls, assistant to Dr. Karlson, is scheduled to succeed him as manager of the branch here.

J. H. Allen, of New York City, and John T. Gamble, formerly of this village, associated with the company in the operation of the Georgia plant until early this winter, have organized the Florida Pulp and Paper Corporation for the manufacture of kraft and will erect a mill at Pensacola, Fla. Mr. Allen, formerly a vice president, will be president of the new concern while Mr. Gamble will serve as vice president and a director.

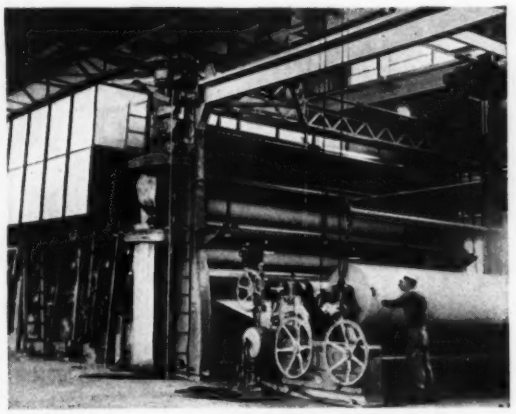
Tissue Association Moves

The Tissue Association has announced that it will move its offices to suite 3502-3504 in the Chanin Building, 122 East 42nd street, from 19 West 44th street, New York. This removal will be effective on March 30. The new telephone number is Murray Hill 3-8763-8764-8765.

In this location the Tissue Association will be centralized in the building with the American Paper and Pulp Association and many other of the major divisions of the paper and pulp industry.

FARREL ROLLS

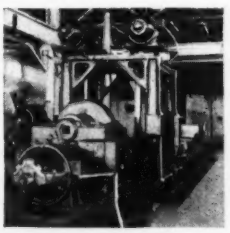
Make Newsprint at SOUTHLAND



In the new mill of the Southland Paper Mills at Lufkin, Texas, the calender stack is equipped with Farrel Rolls. Thus, the south's first newsprint mill joins the leading mills of both South and North who use Farrel Rolls because they possess the qualities so important in the production of paper of uniform high quality.

Farrel Calender Rolls are noted for the uniform depth and hardness of their chilled body surface, the correct shape and amount of crown, and the accuracy and smooth finish of both bodies and journals . . . factors essential to dependable, trouble-free, economical calender performance, minimum maintenance and long life.

These qualities are inherent in all Farrel Rolls and account for the wide preference accorded them in all branches of the paper industry.



Southland will keep its calender rolls in condition by regrinding them in the 36" x 292" Farrel Two-Wheel, Swing-Rest Roll Grinder here illustrated. Farrel Roll Grinders are especially designed for grinding the long rolls used in paper mills and to attain maximum production with uniform and close limits of accuracy and a superior quality of finish.

FARREL-BIRMINGHAM COMPANY, INC.
50 State St., Ansonia, Conn.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for the Week Ending March 20, 1940

	High	Low	Last
A.P.W.	2⅜	2⅛	2⅜
Armstrong Cork Co.	39½	38¼	39½
Celotex Corp.	11	10⅜	10⅜
Celotex Corp., pf.	65½	65	65½
Certain-Teed Products Corp.	6⅜	6⅛	6⅛
Certain-Teed Products Corp., pf.	32	29¼	30½
Champion Paper & Fibre Co.	22¾	21	21
Champion Paper & Fibre Co., pf.	104	103	103
Congoleum-Nairn Co.	24½	23	24
Container Corp. of America	15¾	14⅝	15⅜
Continental-Diamond Fibre Co.	7¼	6⅞	7
Crown-Zellerbach Co.	16	15⅞	15⅝
Crown-Zellerbach Co., pf.	90½	89	89½
Flintkote Co.	19½	19⅛	19⅜
Robert Gair	3⅛	2¾	2⅞
Robert Gair, pf.	14⅛	12½	12½
International Paper & Power	12¼	10⅜	11⅞
International Paper & Power, pf.	55⅝	52½	53½
Johns-Manville Corp.	72½	70½	71
Kimberly Clark Corp.	38½	36¼	37¼
MacAndrews & Forbes	34	34	34
Masonite Corp.	35¼	34½	35¼
Mead Corp.	10	10	10
Mead Corp., pf.	61	61	61
Rayonier, Inc.	16½	15½	16½
Rayonier, Inc., pf.	28	28	28
Ruberoid Co.	20	19⅛	19¼
Scott Paper Co.	46⅜	45¾	46¼
Scott Paper Co., pf.	109	108¼	109
Sutherland Paper Co.	34½	30½	32¾
Union Bag & Paper Corp.	13½	11⅞	12⅞
United Paperboard Co.	4¾	4½	4½
U. S. Gypsum Co.	82¾	80⅛	82

New York Curb Exchange

High, Low and Last for the Week Ending March 20, 1940

	High	Low	Last
Great Northern Paper	43	43	43
National Container Corp.	10⅜	9¼	9½
St. Regis Paper Co.	2¾	2½	2⅝
St. Regis Paper Co., pf.	63	59	60
Taggart Corp.	4⅜	4⅜	4⅜

Consolidated Paper Profits Rise

A substantial improvement in earnings as a result of an increase of 15 per cent in gross order sales is shown in the financial statement of the Consolidated Paper Corporation, Limited for 1939. The balance sheet position shows a further strengthening, net working capital, at $7,638,914 revealing an increase of some $2,900,000 over a year ago. Another bright feature is a reduction of $6,100,000 in banking indebtedness to $1,462,000, a special bank loan of $5,382,616 having been repaid.

Gross operating profit at $5,177,295 compared with $3,890,324 for 1938. After deduction of bank interest, interest on subsidiary's bonds and after charging $1,413,689 accrued interest there was a balance of $3,404,154, which balance has been placed to the credit of reserve for depreciation.

The following reference is made to the Hearst account:

"At the end of the year the Hearst Companies were indebted to the corporation for an amount of $1,526,138, of which $1,336,388 is represented by notes under discounts with our bankers and $189,749 which is included in "accounts and bills receivable." These amounts have been included among current assets to facilitate comparison with previous years. Although deemed to be collectible, your directors feel that these amounts do not now represent items of 'current' indebtedness.

"This indebtedness, in the opinion of counsel, is secured along with indebtedness to other paper suppliers and others, by various Hearst assets which have been pledged or charged to a corporate trustee in New York, in trust for this corporation and other creditors concerned.

"The security so provided is of such character that no estimate of its realizable value can be made at this time.

"An amount considered sufficient to provide for doubtful accounts is included in the 'reserve for contingencies and doubtful accounts'."

St. Regis Nets $547,820

The St. Regis Paper Company and subsidiaries for 1939 shows in its annual report, a consolidated net profit of $547,820 for the year, equal after annual preferred dividend requirements to 5.7 cents a share on 4,120,714 common shares. Earnings contrasted with a deficit of $196,018 for 1938. Dividend arrears on the preferred stock at December 31 were $54.25 a share, or $2,402,353.

Net sales for 1939 were $15,359,478, compared with $12,722,897 for 1938, a gain of 20.7 per cent. Costs, expenses and depreciation reserves aggregated $14,198,296, against $12,364,570, an increase of 14.8 per cent.

The profit for 1939 does not reflect any benefit from the company's equity in the undistributed earnings of Taggart Corporation for the year. The company owns 230,000 shares, or 28.1 per cent of outstanding Taggart common stock.

In 1939, the company paid off $250,000 on its bank loan, which now stands at $6,500,000, and retired $131,000 subsidiary funded debt. Expenditures for improvements and additions were $434,732.

Current assets on December 31 were $8,144,220, including $2,609,003 cash and $3,066,149 inventories, and current liabilities other than bank loans were $1,865,205. Market value of investments at December 31 was $5,306,000, compared with $6,223,000 a year before.

Gair Earns $97,556

The Robert Gair Company, and its domestic subsidiaries for 1939, shows, in its annual report, a net profit of $97,556 before capital losses of $731,418, resulting from sale of scrapping of plants and writing down of assets held for sale and other nonrecurring items. The Gair Company Canada Limited and its subsidiaries earned a net profit of $185,440, stated in Canadian currency. In 1938 the combined properties had a loss of $23,388 and in 1937 a profit of $557,128.

The profit of the parent company as shown is after $194,660 interest on forty-year 6 per cent income notes, George E. Dyke, president, points out, and is after losses of $105,971 from sale of inventories and other charges incident to discontinued operations; an inventory adjustment of $95,000 due to changes in accounting methods; operating losses in an indeterminate amount by unprofitable divisions up to the date of their liquidation; and certain Federal income tax provisions for a subsidiary.

Among properties sold were assets of the specialty

converters division at East Braintree, Mass.; the Cleveland cartons division, four paperboard machines, various equipment and unused real estate in several States, and holdings in G. & S. Holding Company and subsidiaries.

Owing to the decline in volume of business, the company was unable to take its full tonnage of 50,000 tons a year of kraft paperboard from the St. Joe Paper Company, and became in default under its contract, which was closely connected with the purchase by St. Joe of the Thames River Mill.

Net sales to customers of all products in the United States for 1939 were $14,734,890, compared with $13,177,773 for 1938, a gain of 11.8 per cent.

Rolland Paper Nets $13.08 a Share

The annual report of the Rolland Paper Company, manufacturers of fine paper, for 1939, shows a wide expansion in gross and net earnings, as compared with the previous year. Net after all charges was equal to $13.08 a share on preferred stocks of the company, which compares with earnings equal to $8.46 a share on the preferred for 1938, and after preferred dividends $1.77 a share was earned on the outstanding 60,001 shares of common stock as against 61.5 cents a share.

Nashua Paper Profits Higher

The Nashua Gummed and Coated Paper Company reports a net profit for 1939 of $346,886, equal after preferred dividends to $6.74 a share on the common stock. This compares with net profit for 1938 of $194,804, equal to $3.63 a share on the common.

Gross sales for 1939 were $8,133,709, an increase of approximately 15 per cent over the figure of $7,058,724 in 1938.

Howard Smith Profits Up

The Howard Smith Paper Mills Limited, and subsidiary companies reports for 1939 a net profit of $1,447,117, against $948,232 for 1938. Net operating profit, including income from investments and royalties, was $3,121,470, against $2,376,178. After payment of preferred dividends of $375,096, there was a surplus of $1,023,369, against $524,154.

St. Croix Nets $8.11 Per Share

Report of the St. Croix Paper Company for the year ended December 31, 1939, shows net profit of $229,323 after all charges, equal, after preferred dividends, to $8.11 a common share. Net in previous year was $135,230, or $4.21 a share on common.

Sorg Paper Earns $136,783

The Sorg Paper Company for 1939 reports a net profit of $136,783, equal to $2.61 each on 17,000 shares of common stock, contrasted with a net loss of $289,317 for 1938.

Puget Sound Pays Dividend

A dividend of 50 cents a share on the common stock of the Puget Sound Pulp and Timber Company has been declared. Previously a payment of 25 cents was made on October 11, 1937.

Price Brothers Profits Up

The financial statement of Price Brothers and Company, Limited, has just gone forward to shareholders. It is for the nine months ended December 31 last, the fiscal year having been changed from March 31 last year. The statement shows a substantial improvement in net results combined with a marked strengthening of the balance sheet position, net working capital at the year-end showing an increase of approximately $2.5 millions at $9,745,148.

Total income for the year was $2,335,765 as compared with $2,092,782 for the 12 months ended March 31, 1939. After all charges including bond interest, depreciation, depletion and taxes, net profit at $387,453 compared with $3.577 for the previous full year. This net was equal to $6.16 per share on the 5½ per cent preferred, against 5.7 cents per preferred share for the previous year. After deduction of an amount equivalent to 9 months' dividend on the preferred, $259,227, balance of net profit of $128,226 was equal to 23 cents per common share.

The balance sheet shows current assets at $14,488,401, against $12,497,039 a year ago, current liabilities at $4,743,253 against $5,237,682, leaving net working capital at $9,745,148 against $7,259,357.

Earned surplus at December 31, 1939, stood at $714,598 against $503,806 as of March 31, 1939.

Nashua Nets $6.74 per Share

The Nashua Gummed and Coated Paper Company for 1939 reports a consolidated net profit of $346,886 after minority interest and reserves for Canadian exchange. After deducting premiums paid on preferred stock called for redemption, and preferred dividends, the balance of $310,550 was equal to $6.74 each on 46,058 outstanding shares of common stock. Consolidated net profit for 1938 was $194,804, or $3.63 a share, after preferred dividends. Consolidated gross sales last year were $8,133,709, an increase of 15 per cent over the 1938 total of $7,058,724. Current assets at end of 1939 were $2,620,154, and current liabilities, $575,772.

Scott Paper Sales Higher

The Scott Paper Company announced today that sales shipped for the first two months of 1940 showed an increase over the like months of last year.

The average weekly manufacturing output of the company for the two months exceeded the average for the same period in 1939, due, the company states, to expansion in paper making capacity during the past year.

St. Helens Earns $1.55 a Share

The St. Helens Pulp and Paper Company for 1939 reports a net profit of $310,405, equal to $1.55 each on 199,934 shares of common stock, compared with a net profit of $316,970, or $1.59 a share in 1938.

Munising Reports Loss

The Munising Paper Company for 1939 reports net loss of $4,728, contrasted with a net profit of $12,742 in 1938.

C. I. Ruderman Heads Ryther & Pringle

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., March 18, 1940—A reorganization of the Ryther & Pringle Company, manufacturers of paper mill equipment, has resulted in the selection of Charles I. Ruderman as president and general manager. His election took place at a meeting of the board of directors and it is understood that he holds a controlling interest in the concern. Fred W. Roberts, of the Roberts Manufacturing Company, Lockport, was elected vice president and Thomas C. Lynch, of Carthage, secretary and treasurer. Among the new directors are William M. Fox and Allen J. Fritz, both of this village. Mr. Fritz will continue as superintendent of the plant while John J. Grieb, who has been with the concern since 1914, will serve as plant engineer. Delbert P. Thomas will be office manager.

The reorganization will be followed immediately by complete renovation of the buildings and a touch of modernism to the products manufactured, according to an official. All of the structures, including a machine shop, foundry and pattern shop, will be modernized and improved under the new plan which will enable an increase in production. A warehouse for new steel, mine and mill supplies is also to be constructed. Among the products to be manufactured or processed by Ryther and Pringle are mill and mine machinery, new steel, belting, pulleys, transmissions and heating fixtures. The company was established in 1872 by C. P. Ryther and James Pringle. Surrounded by paper mills, the concern turned naturally to the development of paper making equipment. Specialization was made particularly in apparatus for ground wood and chemical processes. Trade was brisk and later branch offices were established in Paris and Oslo, Norway. The concern operated as a partnership until 1900 when it was incorporated. Offices were maintained in principal parts of the world until the deaths of the leaders of the company in 1930.

Japan Uses Less Pulp

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 20, 1940—The total amount of chemical and mechanical wood pulp consumed by Japanese companies affiliated with the Japan Paper Manufacturers Association during the third quarter of 1939 was 237,743 short tons, including 210,593 tons produced and consumed by the same companies and 27,146 tons purchased on the open market, the latter including domestic and imported paper pulp. Compared with the preceding quarter, the total amount of paper pulp consumed was about 500 tons less but compared with the amount used during the third quarter of 1938 there was a gain of 1,869 tons. During the first 9 months of 1939 the total amount of paper pulp consumed equalled 692,143 short tons compared with 630,734 tons during the same period of 1938, an increase of 1.7 per cent.

NORMAN B. SCOTT
WALTER S. HODGES
JOHN L. PURDY
FRANK B. EILERS
WM. S. CASPARIS
MEET THE MEN WHO SELL ORR FELTS
If you have a felt problem, here are the men to help you solve it. Mr. Eilers, dean of the "force," has been contacting the mills, for many years. The same holds true of Messrs. Purdy, Scott, Hodges and Casparis. If these men have cooperated on one felt problem, they have cooperated on a thousand. Why not take advantage of their broad experience?
And remember this—the superior water removal qualities and longer wear of Orr Felts account for the Orr plant being the largest felt mill in the world.
THE ORR FELT AND BLANKET COMPANY
Piqua, Ohio
ORR FELTS

Stowe-Woodward Rubber Covered Rolls At Rayonier and Southland Mills

Both of the South's newest mills, the Southland Paper Mills, Inc. at Lufkin, Tex., and Rayonier, Inc. at Fernandina, Fla., are operating a number of rolls covered by Stowe-Woodward, Inc. of Newton Upper Falls, Mass.

At Southland, the Pusey-Jones machine is equipped with two suction press rolls and a Tannite lumpbreaker roll—all three covered by Stowe-Woodward and supplied through the Beloit Iron Works. The suction press rolls are 36-inch diameter by 246-inch face and are among the largest ever covered in this country, while the lumpbreaker roll is 17-inch diameter by 238-inch face.

AMONG THE LARGEST EVER COVERED IN THIS COUNTRY, THIS 36-INCH DIAMETER BY 246-INCH FACE RUBBER COVERED SUCTION PRESS ROLL IS NOW OPERATING AT SOUTHLAND PAPER MILLS, INC. IT IS ONE OF TWO COVERED BY STOWE-WOODWARD, INC. AND FURNISHED THROUGH THE BELOIT IRON WORKS.

At Rayonier, Inc., the top first press, top smoothing press, bottom smoothing press and three bottom press rolls are all Stowe-Woodward covered and were furnished through Rice, Barton & Fales, Inc. The press rolls were 28-inch diameter by 135-inch face and the smoothing rolls were 30-inch diameter.

Herty Forest Institute Gets Charter

[FROM OUR REGULAR CORRESPONDENT]

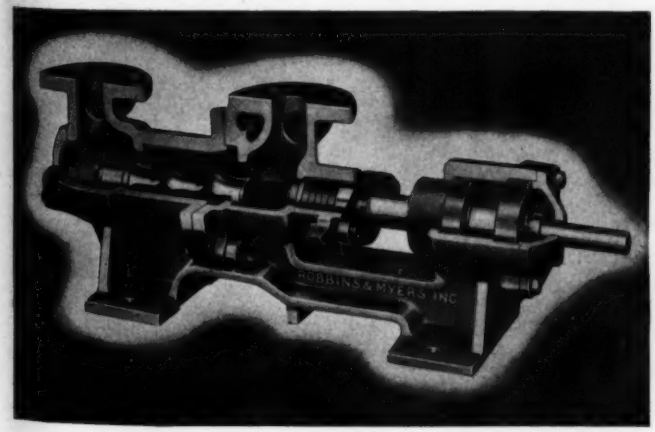
WAYCROSS, Ga., March 18, 1940—The Herty Forest Institute, dedicated to the conservation of the forest resources of the Southeast through an educational and demonstration program, last week accepted its charter and formed a permanent organization with George M. Bazemore, Waycross banker and civic leader, as president; Senator Jack Williams, editor and publisher of the Waycross *Journal-Herald*, as vice president; L. M. Lipsey, president of the Waycross and Ware County Chamber of Commerce, as secretary-treasurer, and J. S. Elkins as educational director.

The immediate purchase of a building to house the Herty Forest Institute museum and library, was authorized, and remodeling of the building will be started at once, followed by a general educational program for forest conservation and utilization.

The institute is a permanent, living memorial to the late Dr. Charles H. Herty, eminent Georgia chemist whose research influenced the great expansion of the paper and pulp industry in the Southeast.

Cut Service Costs with NEW
R & M MOYNO SLIP PUMP

The Moyno Slip Pump has no valves or pistons. A rotor with a single helical thread turns within a stator having a double helical thread, forcing the slip ahead of the helical surfaces with constant pressure without turbulence, foaming, or cavitation. It acts the same as though a piston were moved forward with uniform speed through a cylinder of infinite length. As a result of this extremely simple, "one-moving-part" construction, wear is kept at a minimum, necessary repairs made infrequent, and lost pumping time all but eliminated.



Handling solids in suspension up to approximately 30%, the R & M Moyno Slip Pump takes heavy, hard-to-handle materials up to the rolls easily and efficiently—an essential ability in pumping slip.

Get complete details on this proved, profitable slip pump AT ONCE. Address:

ROBBINS & MYERS, Inc.

MOYNO PUMP DIVISION

SPRINGFIELD, OHIO

Honor for Professor Otto Maas

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 18, 1940—Professor O. Maas, of McGill University, Montreal, who has made many valuable contributions to science as applied to the manufacture of pulp and paper, has just been admitted to the Fellowship of the Royal Society in England, being one of the 20 scientists thus honored at a meeting in London on March 15. Professor Maas has been head of the department of chemistry at McGill for the past three years and is well known both in Canada and in the United States for his training of students during their post-graduate work. He is the author of many scientific publications.

Before his appointment as head of the chemistry department in succession to Dr. F. M. G. Johnson in 1937, he was Macdonald Professor of Physical Chemistry at McGill for many years.

A native of New York city, Dr. Maas was educated at Montreal High School and McGill University, whence he received his Bachelor of Arts degree in 1911. He obtained his Ph.D. from Harvard University in 1919 and was appointed a demonstrator at McGill immediately after this, becoming subsequently first assistant and associate professor before his appointment to the chair of physical chemistry.

After his graduation from McGill, Dr. Maas studied at the University of Berlin under Prof. Walter Nernst. At Harvard, later, he studied under Prof. T. W. Richards.

He is a Fellow of the Royal Society of Canada, and in 1938 was elected president of the Canadian Institute of Chemistry.

Potdevin at Tenth Packaging Exposition

Gluing and pasting machines will monopolize the Potdevin Machine Company display (Booth No. 101) at the Tenth Packaging Exposition. Several typical machines will be operating to show their uses and advantages.

Potdevin representatives will be on hand to discuss these smaller units as well as the Company's extensive line of laminating machines, aniline and oil-ink roll-and-rewind presses, paper bag machines and waxing machines.

Samples of work, such as 2-side, multi-color aniline printing, rotogravure printing, lacquering, aniline-on-cellophane printing, oil-ink printing on cement and flour bag papers, will be displayed. There will be, also, samples of the numerous types of paper bags made on Potdevin machines. A typical collection of photographs of Potdevin equipment will be exhibited. Those who desire to see these larger units in operation are invited to visit the Potdevin Display Hall, 1223 38th street, Brooklyn, N. Y.

Potdevin representatives at the exposition will be Charles Schaefer, W. P. Schaefer, O. Denton, S. Norton, W. V. Hunter, J. H. Richmond and R. P. Bechle. The Tenth Packaging Exposition will be held at the Hotel Astor in New York City, March 26 through March 29.

ONE BATTLE THAT
Slimform NEVER WINS

● Slime-forming organisms never have a chance of winning against chlorine and ammonia application, correctly controlled with W & T apparatus.

You know what slime costs in your mill.

Balance that cost against the cost of chlorine-ammonia treatment—from 1½ cents to 6 cents per ton of product, as shown by experience in over 200 leading mills.

And remember—you'll always be betting on the winner when you put your money on chlorine-ammonia treatment to lick Slimform.

Write today for the complete information as given in Research Publication No. 327 "Slime in Paper Mills—Its Origin and Prevention".

WALLACE & TIERNAN CO. Inc.

Manufacturers of Chlorine and Ammonia Control Apparatus

NEWARK, NEW JERSEY Branches in Principal Cities

Stock losses—bacterial decomposition and reworking of stock

Lowered quality—slime spots—pin holes—objectionable odors

Increased costs—in water, heat, labor, chemicals

Maintenance troubles—blinded wires, plugged felts

Frequent clean-ups—slime breaks—poor sheet formation

Obstruction of lines—stock and white water lines

Recirculation difficulties—slime growths in recirculated systems

Mechanical strain on felts and wires—shortened useful felt and wire life

Other W & T *Control Services:*

Automatic pH Control • Dry Chemical Feeders • Bleach Plant Equipment • Testing Instruments for Chlorine and pH

P-18

Inspirations for Printers

Westvaco Inspirations for Printers, Series 1938-1939, has been issued in a handsome art cloth binding by the West Virginia Pulp and Paper Company, 230 Park avenue, New York. The volume contains the twelve bi-monthly issues of Westvaco inspirations issued during the years 1938 and 1939. This collection of selected specimens of fine black and color printing, distinctive typography created by the use of attractive type faces and printed on fine Westvaco mill brand papers, should prove of great interest to all in the printing trades interested in creative printing.

The papers used include West Virginia's Blendfold Enamel, Clear Spring Plate, Clear Spring Super Plate, Clear Spring Text Laid, Clear Spring Text Wove, India Tint, Inspiration Eggshell, Inspiration English Finish, Inspiration Offset, Inspiration Offset Enamel, Inspiration Super, India Tint, Marva Satin Finish, Marva Satin Finish Super, Piedmont Enamel, Pinnacle Enamel and Sterling Enamel.

Westminster To Redeem Bonds

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., March 16, 1940—The entire funded debt of Westminster Paper Company, New Westminster, B. C., has been called for redemption on April 1, and the outstanding bonds will be redeemed from the company's own cash resources except for a small loan. No major borrowing is required to wipe out the company's obligations.

By retiring the 6½ per cent first mortgage sinking fund debentures, a saving of about $1100 will be effected. These debentures dated April 1, 1930, and due April, 1950, are callable at 105 to March 31, 1940, and thereafter at 103.

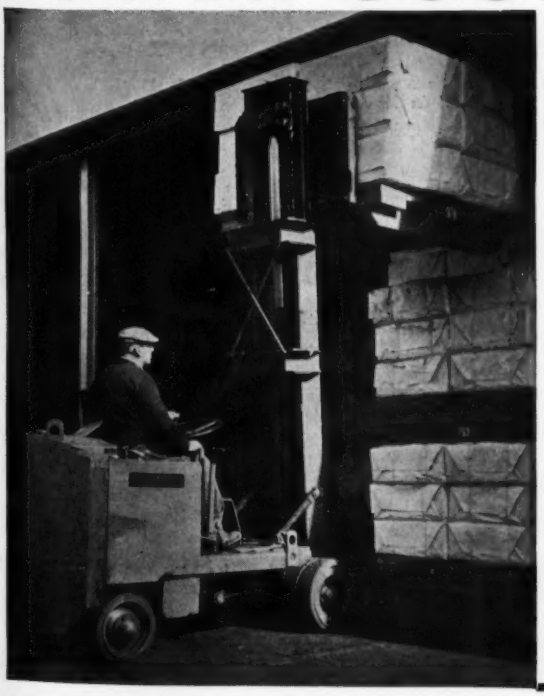
The original issue was $300,000, but through operation of the sinking fund the outstanding amount had been reduced to $204,500 at January 31, 1939. The company then had $91,500 of the latter amount in its sinking funds so that the net amount outstanding was $113,000.

When a proposal considered last fall for a short-term bank loan to retire the remainder of the debt became inexpedient because of the outbreak of war, the company adopted a new policy. It was decided to curtail customary capital expenditures in connection with the continuous modernization programme until funds had accumulated sufficiently to pay off the bonds from the company's own cash resources.

Prince Rupert Project Postponed

While conditions have resulted in temporary postponement of plans for erection of a new pulp and paper plant at Prince Rupert, B. C., the project is still being kept alive and will undoubtedly be proceeded with at a later date. This was revealed recently by Frank Buckley of Vancouver, chief promoter of the northern B. C. plant, during a visit to Prince Rupert. He stated that apart from the prospective site of the new plant having now been taken over for other purposes, the scheme remained as intact as formerly although delay had arisen in putting it into operation.

FEWER SERVICE INTERRUPTIONS MEANS LOWER COST PER TON WITH



TOWMOTORS CLEVELAND

The unusually rugged construction of TOWMOTOR Lift Trucks and Tractors cuts the costly service and repair interruptions met in ordinary units. And the straight gas power eliminates the regular charging stops required in battery powered units.

Proof of the savings that TOWMOTORS effect in these two factors of handling operation is the reason so many pulp and paper products concerns are "going" TOWMOTOR.

Write for action picture bulletin and complete details today.

TOWMOTOR CO.

1220 E. 152nd St. Cleveland, Ohio

SALES OFFICES IN PRINCIPAL CITIES

Indianapolis Demand Expanding

INDIANAPOLIS, Ind., March 18, 1940—No disturbing factors were to be seen in the local paper business during the last week and demand in some lines seems to be expanding gradually. The season is a trifle better than it was a year ago and there are few who believe that this year will lag behind last in volume. Prices for the most part are being well held on all lines.

The fine paper demand shows little change, but orders are frequent, even if small per individual order. Weather conditions have not been the best for spring demand, but any break that presages spring will show some increase, it is believed. Prices are firm.

The past week saw the first demand for summer specialties, which shows spring is not far away. Local jobbers say they have some nice deals when the time arrives and that displays will be even more attractive than they were last year. Prices will be about the same as a year ago from present indications. Tissues moved well last week with perhaps a little increase over the week before.

Box demand is improving gradually. Local manufacturers and jobbers say there was a big demand from both the confectionery and floral trade in preparation for Easter. An increase in heavy corrugated boxes for the brewery trade also was noted. Other industrial demand is about the same it has been for a month. Manufacturers generally have relatively low warehouse stocks and production is reported nearly normal.

The coming month is expected to show a big increase in demand for containers for the creamery and ice cream trade. The larger manufacturers in each line had little stock to carry over and will be getting into the market shortly.

Building paper demand has shown a big increase in the last week following a dead period in the middle of the winter when building virtually was impossible.

Dr. Price Heads Chemists Alumni

Dr. Donald Price, chief research chemist for the National Oil Products Company, Harrison, N. J., today is the first president of the newly organized Chemists Alumni Association of Columbia University, New York City.

Dr. Harry L. Fisher, associate director of research, U. S. Industrial Alcohol Company, was elected vice-president and Wendell G. Fogg, chief chemist of Air Reduction Company, Stamford, Conn., secretary-treasurer. Election of officers was held at the January meeting, but the announcement was withheld until all alumni were notified.

There are believed to be more than 3,000 alumni eligible for new alumni group. The organization of such an association was voted at the Columbia luncheon held in Boston during the American Chemical Society meeting last September.

Dr. Price is a graduate of the class of 1924 at Columbia University, where he majored in chemistry. He holds the following degrees: A.B., A.M., Ph.D.

Dr. Price has been associated with the National Oil Products Company for 3½ years, starting as a chemist in the research laboratory.

"NON-USERS ARE THE LOSERS"

TENAX FELTS

FINISH AND SPEED

WELL DONE—KEEP IT UP!

Some few men who attend this year's conventions have known and used TENAX FELTS for fifty years—others have used them with satisfaction and profit for ten, twenty, thirty, forty years—all join in voicing their approval. They speak hearty words of encouragement for services rendered and continuous services ahead.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

NEWFANE, N. Y.–U. S. A.

To Erect New Wadding Unit

(Continued from page 11)

paper-making costs and greatly reduce stream pollution.

Thinks Cheaper Newsprint Possible

George W. Trayer of the forest productions division of the United States Forest Service, testified that appropriation cuts would mean drastic curtailment of research in the chemical utilization of wood and wood waste "When we are on the threshhold of something big. We think there is a new opportunity for the South in the production of newsprint. In newsprint there is about 20 to 25 per cent chemical pulp and about 75 or 80 per cent groundwood, which is cheaper than the chemical pulp. For the chemical portion of the pulp we have developed a semi-chemical pulp from cheap gum which can make up 20, 25 or even 30 per cent of the mix, and to that you can add pine groundwood and get a splendid grade of newsprint paper. By using gum this way, we believe newsprint can be produced at $4 to $5 per ton cheaper."

In an address before the Wisconsin Conference of Engineers at Milwaukee, Wis. March 14, L. J. Markwardt, principal engineer of the Forest Products Laboratory, described the rapid progress being made in finding new uses for wood waste materials. Lignin waste from paper mills, when properly treated, can be molded to form a black plastic which may be machined on a lathe like metal and does not nick.

Monopoly Charged in Hardboard

Masonite Corporation, Wausau, Wis., is named with nine other companies, in a suit filed last week by the Department of Justice, charging they had monopolized the trade in hardboard, a composition used in interior construction work. The suit would be brought, Attorney General Jackson said, to test the "validity of the use of patent privileges to circumvent the anti-trust laws."

Hardboard, Mr. Jackson said, is produced under patents held by the Masonite Corporation, which manufactures 96.5 per cent of the annual production of more than 200,000,000 square feet of the boards made from wood or vegetable fiber. The corporation's product, he said, was sold under agency contracts which permit Masonite to fix prices. These other companies, he declared, "are potential competitors in the manufacture of hardboard."

Ben Alexander, president of Masonite, defended agency contracts in a statement, declaring such contracts "have been recognized by the common law for more than 200 years and their legality has been upheld by the Supreme Court of the United States, notably in the Westinghouse and General Electric cases."

Plan to Conserve Water Approved

Wisconsin Valley Improvement Company, Wausau, Wis., has been given approval of the Wisconsin Public Service Commission of a proposal to prevent the loss of water to paper mills on the Wisconsin River because of a dam to be built across the Little Rice River in Oneida County. The pond is to be drained down annually three feet between November 15 and December 15, releasing the water into the company's reservoir 120 rods downstream.

"Stainless Color Carts Save Us Money"

SAYS OHIO MILL MAN

Life's not so rosy for this tank on wheels. Colors for coated papers are *tough* bed-fellows. Yet ARMCO Stainless Steel always "comes back for more," in the words of a prominent Ohio mill superintendent.

"We've had these color carts two years now," he volunteered. "Before we bought stainless steel, ordinary metal carts became sieves every five or six months. But these stainless wagons will last years longer than we ever dreamed of. They save us money other ways too. A spray of cold water and they're clean and smooth. There's no danger of off-color or color contamination here."

For carts, head boxes and other important equipment you'll profit by using ARMCO Stainless Steels. These durable metals resist rust and slime-growth, help bring paper products through clean. Let us assist in selecting the right grade of ARMCO Stainless for your requirements. Write The American Rolling Mill Company, 1121 Curtis Street, Middletown, Ohio, U. S. A.

ARMCO

ARMCO STAINLESS STEELS

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Vol. 110 March 21, 1940 No. 12

COMING EVENTS IN PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Olympic Hotel, Seattle, Wash., August 20-23.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Annual Convention, Netherland Plaza Hotel, Cincinnati, Ohio. June 18-20.

NATIONAL SAFETY COUNCIL, PAPER AND PULP SECTION, Annual Meeting, Stevens Hotel, Chicago, Ill. October 7-11.

PIONEER MILLS IN THE SOUTH

The PAPER TRADE JOURNAL presents in this issue articles on two important new mills which have just gone into operation, one of which is now producing high grade papermaking and rayon pulps, and other utilizing Southern pine for the manufacture of newsprint. Each of these mills is the first of its kind and they have been built at the combined expenditure of $14,000,000 by men who, turning their faces toward the future, have entered new and largely unexplored fields, confident that after preliminary obstacles had been overcome, the technological knowledge of today could be fully utilized in large-scale production of cellulose and paper. These two enterprises are, therefore, pioneers in their fields and their accomplishments may well serve to encourage further industrial expansion of the South and greatly improve its economic condition.

The mill of Rayonier, Inc., erected at Fernandina, Fla. is the first mill in the South to make bleached sulphite pulp from native Southern pine. It represents an investment of $8,000,000 and is expected to produce about 65,000 tons of pulp a year. Rayonier, Inc., which is a Pacific Coast organization, is a large and growing producer of high grade bleached sulphite pulp for the manufacture of bond and ledger papers and also a producer of dissolving pulps of highly pure cellulose used in the manufacture of rayon, lacquers, transparent wrapping films and plastics.

The new Rayonier mill at Fernandina is built on a site covering 240,000 acres and has the advantages of close proximity to important Eastern Seaboard markets and excellent facilities for shipping its products to South American and European ports. Rayonier is also well entrenched within the belt of abundant and cheap Southern species of pines, which foresters have estimated will provide ample supplies of pulpwood. The mill is also located in the artesian well region and with access to supplies of lime rock and sulphur, which form the major raw materials.

The Southland Paper Mills, Inc. have erected near Lufkin, Tex., a modern mill for the production of newsprint from Eastern Texas pine. The mill site has been named Herty, in honor of the late Dr. Charles Herty whose experiments in the utilization of Southern pine for the manufacture of white paper is widely known. Sponsored by the Southern Newspaper Publishers Association, the officers and directors of the Southland Paper Mills, include prominent newspaper publishers and pulp and paper men of New York. The mill was constructed primarily for the manufacture of newsprint and cost $6,000,000. Ground was broken on January 14, 1939 and the first commercial run of newsprint was made on January 17, 1940. The Lufkin *Daily News* printed its January 26 edition on the first roll of newsprint produced by the Southland mill.

The Southland mill has a daily capacity of 150 tons of newsprint and the entire output has been contracted for by newspaper publishers in Texas, Louisiana and Arkansas. The mill is located on a 300-acre site in an area where sawmills have been in profitable operation for years. It is assured of a perpetual supply of pulpwood and the mill is well located about two miles from Lufkin, a city of approximately 10,000 population.

The Southland mill is essentially a newsprint manufacturing plant. The equipment embodies the latest and most efficient machinery for production and control of the product. The plant is not at present equipped to manufacture chemical pulp and receives its bleached sulphate pine pulp from the Champion Paper and Fibre Company of Houston. Southland produces its own ground wood and the grinding room is equipped with the great Northern type of grinders.

When Southland began its commercial operation its paper machine was first tested at a running speed of 600 feet a minute and later tuned up to 1250 feet a minute. To the surprise of experienced engineers, no appreciable trouble was experienced from resin or pitch. The first newsprint mill in the South had apparently proven a success from the start of operation.

The interesting stories of the Southland Paper Mills and the Rayonier Inc., in this issue of the PAPER TRADE JOURNAL, augurs well for the future of the industrial minded South. The success of these enterprises has encouraged former Governor Gordon Browning and associates to formulate definite plans

for the construction of a newsprint mill at Savannah, Tenn., to be known as the Tennessee Valley Paper Mills, Inc., the plant to be built at an estimated cost of $6,000,000. Obviously all this presages the beginning of a new and important era in the pulp and paper making history of the South.

I. P. Licensed to Use Secondary Head Box

The Hummel-Ross Fibre Corporation has announced that during January the International Paper Company and Southern Kraft Corporation were licensed to use the secondary head box under the following American and Canadian patents: *United States Letters Patent* 2,098,733 Re. 20,667; *Canadian Letters Patents* 364,597, 374,724, 380,169.

In this transaction Southern Kraft Corporation assigned to Hummel-Ross Fibre Corporation exclusive licenses under the Charlton, Nicholson and Tuten patents and the applications therefore, with the right in Hummel-Ross Fibre Corporation to grant sub-licenses thereunder to the licensees of Hummel-Ross Fibre Corporation under its Sale patents relating to the manufacture of multiple-ply paper and board involving the use of secondary head boxes.

The amount of royalty to be paid by the International Paper Company was not disclosed.

Among the other licensees on the North American continent are: Union Bag and Paper Corporation at Savannah; Filer Fibre Company, Filer City, Mich.; Albemarle-Chesapeake Corporation, West Point, Va., and the Ocean Falls mill of the Zellerbach Corporation.

Longview Orders Beloit Machine

R. S. Wertheimer, manager of the Longview Fibre company of Longview, Wash, announced the purchase of a new Fourdrinier paper machine. It is expected to be in operation by the latter part of this year. This machine is being made by the Beloit Iron Works of Beloit, Wis. and will have a wire width of 200 inches.

The machine will produce various grades of kraft paper and kraft board, and will have a daily capacity of from 100 to 150 tons per day, depending upon the grade run. This machine, which will be known as No. 5, will produce paper that will replace that now made on the No. 3 paper machine which has a capacity of only 40 tons a day. Installation, despite the machine's great size, will not require any additional building inasmuch as space had already been provided for another paper machine.

The Longview Fibre company recently completed a 500 by 140 foot building in which the bag manufacturing plant is housed. This addition, coupled with others that have been made to provide additional storage and warehouse space, allows ample room for the new machine in the main machine room.

Crown Zellerbach Pays Dividend

The Crown Zellerbach Corporation has declared a final dividend of 50 cents for the fiscal year ended April 30, bringing payments for the year to $1 against 50 cents in previous year. The dividend is payable April 1 to stockholders of record March 13.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	90.6%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	86.5%	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	.....	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	.....	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	.....	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	.....	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	.....	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	.....	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	.....	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	84.9%	72.3%	80.6%	81.3%	70.5%	.....
First 10 weeks	88.3%	80.4%	66.8%	90.1%	77.3%	67.9%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
February 3	89.5%	February 4	80.7%
February 10	88.2%	February 11	82.8%
February 17	86.9%	February 18	82.6%
February 24	86.6%	February 25	80.6%
March 2	84.0%	March 4	83.5%
March 9	79.9%	March 11	84.2%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Feb. 3, 1940	Feb. 10, 1940	Feb. 17, 1940	Feb. 24, 1940	Mar. 2, 1940	Mar. 9, 1940
0% to 50%	45	46	50	46	53	42
51% to 100%	255	255	247	249	232	144
Total Mills Reporting	300	301	297	295	285	186

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	....	....	....	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%
1940	....	....	....	....	....	....

Week end. Feb. 3, 1940—72%
Week end. Feb. 10, 1940—71%
Week end. Feb. 17, 1940—70%
Week end. Feb. 24, 1940—69%
Week end. Mar. 2, 1940—69%
Week end. Mar. 9, 1940—69%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

Refuse to Make Paper on Sunday

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., March 18, 1940—A dispute relative to working on Sunday at the National Paper Products Company resulted in the suspension of operations on paper machines during the entire week with the result that about 60 men are idle. The converting division is operating daily. Although there has been no official statement, it is said that the controversy arose when members of the local refused to make paper on Sunday. There was no disagreement over an overtime wage scale but the men apparently do not wish to work on Sundays. Union officials have been here to discuss the matter with members of the local and it is understood that an attempt will be made to settle the dispute. Production is going on as usual and it is said there is a sufficient surplus of paper to supply the converting department for a month without operating the paper machines.

STOCK PREPARATION AT *Southland*

"VALLEY" VORTEX BEATERS

"VALLEY" BROKE BEATER

Southland Paper Mills needed quick breaking of purchased pulp and equally quick hydration after breaking.

The logical choice was the VALLEY-VORTEX—the beater with the most terrific tearing and brushing action yet devised. Bales of pulp melt away. Ten minutes furnishing time for dry pulp permits VALLEY-VORTEX to "loaf".

And then, the stator goes down and hydration commences at once. Rapid cycling and high production is the specialty of the VALLEY-VORTEX.

The VALLEY BROKE BEATER in the basement takes care of machine broke—quietly, effectively and continuously.

Let us show how Valley Beaters—backed by over 45 years of beater-building experience—can give you peak beating efficiency.

VALLEY
IRON WORKS COMPANY

Eastern Representative:
Harry Bennett, 12 McKinley St.,
Bronxville, Westchester Co., N. Y.

Plant:
Appleton, Wisconsin

Canadian Agents: Pulp & Paper Mill Acc. Ltd., Dominion Sq. Bldg., Montreal, Quebec, Can.

High-Speed Beaters • Breaker Beaters • Sutherland Refiners • Vortex Beaters • Roll-Headers
Thickeners • Deckers • Screw Presses • Laboratory Equipment • Plug Valves
Flat and Rotary Screens • Micro-Mist Spray Dampeners • Voith Pulpers • Paper Markers

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

The Rayonier Fernandina Water Treatment Plant*

By Eskel Nordell[1] and Charles E. Richheimer[2]

Abstract

The Fernandina Division of Rayonier Incorporated, the first mill to make rayon pulp out of southern pine, draws its water supply from deep artesian wells. This water contains about 3.6 p.p.m. of hydrogen sulphide and has a hardness of approximately 340 p.p.m. All of the water is freed from hydrogen sulphide in a novel, 2-stage, 30,000,000 g.p.d. degasifier. Of this pretreated water 7,500,000 g.p.d. is then completely softened by a battery of 8 automatic zeolite water softeners at an operating cost of only 0.3 cent per 1000 gallons. This extremely low softening cost is obtained by using sea water for regenerating the zeolite water softeners. The sea water is pumped from the Amelia River, chlorinated, coagulated, and filtered through a battery of 3 horizontal sea water filters. The boiler feed water is pretreated with lime to reduce the bicarbonate hardness and then is completely softened by a battery of 3 carbonaceous zeolite water softeners which are also regenerated with sea water.

The Fernandina Mill of Rayonier Incorporated, is of particular interest as it is the first mill for the manufacture of rayon pulp from slash pine to be constructed in the south. This mill is located at Fernandina on the northeastern coast of Florida. Fernandina, one of the oldest seaports in the country, is situated on Amelia Island and has an excellent harbor, formed by a tidal river—the Amelia River—which separates the island from the mainland. The mill site fronts on this river thus affording facilities for water shipments. Rail shipping facilities are furnished by the Seaboard Railway.

Raw Water Supply

Detailed investigations of all possible sources of raw water and necessary treatments therefore indicated that deep artesian wells, extending into the underlying limestone aquifer would be the best source of raw water for the mill, as the presence of sea water near the millsite allowed the engineers to call upon previous experience to design an entirely auto-

* Presented at the Annual meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 19-22, 1940.
The water treatment plant was designed by Charles E. Richheimer of G. A. Youngberg & Associates, consulting engineers, Jacksonville, Fla. The automatic main zeolite water softener plant, sea water filters, and carbonaceous zeolite water softeners were furnished by the Permutit Co.
[1] The Permutit Co., 330 W. 42 St., New York, N. Y.
[2] G. A. Youngberg & Associates, Jacksonville, Fla.

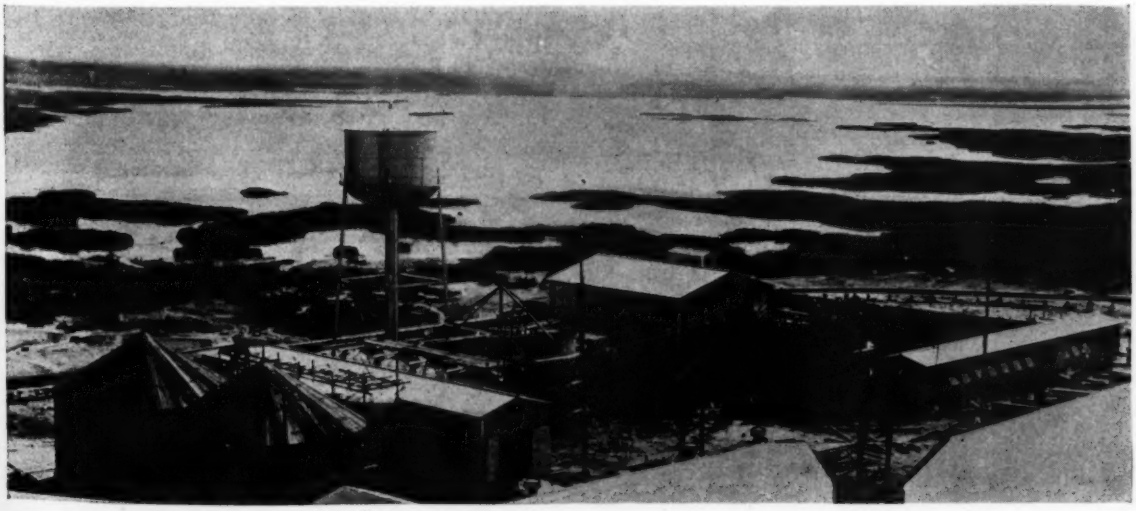


FIG. 1. WATER TREATMENT PLANT
Left to right:—Soft water storage tanks, main zeolite plant, sea water storage tank, boiler feed water storage tank (unfinished) and plant (housed), reservoir and pump house.

matic zeolite treatment, sea water regenerated, water softening plant. This plant produces very satisfactory softened water at an extremely low overall operating expense to the mill.

The artesian well water is clear and colorless. It contains, however, about 3.6 p.p.m. of hydrogen sulphide, and has a hardness content of about 340 p.p.m. or 20 gr. per U. S. gallon.

Sea Water Supply

The sea water is obtained at the plant site from the Amelia River which is a wide deep tidal river, giving excellent access to the water from the ocean. An alternative source, if it should ever be required in the future, is the Atlantic Ocean, which can be reached by a 2½-mile pipe line.

Pretreatment of Raw Water

Preliminary experiments carried out with various designs of coke and slat type aerators showed that simple aeration would not suffice to remove more than 50 to 60 per cent of the hydrogen sulphide content. Extensive field experiments were, therefore, carried out by one of the coauthors—Eskel Nordell —assisted by F. V. Ryder. These experiments proved that satisfactory reduction of the hydrogen sulphide content could be obtained by means of a 2-chambered degasifier which used flue gas in a closed upper chamber and air in an open lower chamber.

The 30,000,000 g.p.d. 2-chambered degasifier used for removing the hydrogen sulphide from all of the water used in the mill was designed from the data obtained by this field work. The flue gas used in this process is obtained from the boiler breeching at the stack. It is first passed through a scrubber filled with limestone, in which it is washed with sprays of water.

The scrubbed flue gas is introduced into the bottom of the closed upper compartment of the degasifier. It then circulates upwardly through the chamber and is discharged to the atmosphere from the top of this chamber.

The raw water rains downwardly through this chamber over a series of superimposed slat trays thus flowing countercurrent to the flow of the flue gas. The CO_2 of the flue gas lowers the *p*H value of the water thus liberating the hydrogen sulphide which is discharged with the spent gases.

The water then flows from this closed upper chamber to a lower open chamber similarly provided with slat trays. The aeration accomplished in this lower chamber removes the CO_2 introduced by the flue gas from the sulphur-free water. This process has proven to be very satisfactory in eliminating hydrogen sulphide and is very economical in operating cost.

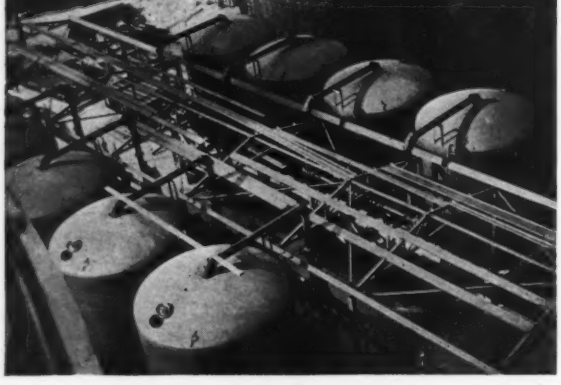


FIG. 2. CONSTRUCTION VIEW
Elevated view main zeolite plant showing both batteries of 4 units each.

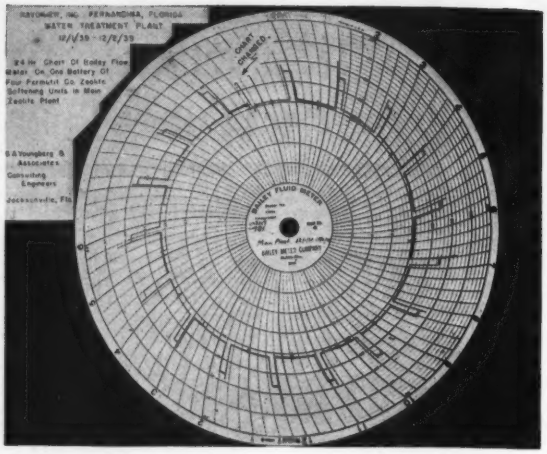


FIG. 3. METER CHART
Meter Chart showing performance of one battery of zeolite water softeners.

Main Water Softening Plant

The automatic sea water regenerated zeolite water softening plant has a production capacity of 7,500,000 g.p.d. of treated water. The overall cost of operation of this plant, using sea water to regenerate the zeolite units, is approximately $3.00 per 1,000,000 gal. of water treated. For purposes of comparison, a conventional lime-soda treatment plant would have had an operating cost (for chemicals alone) of approximately $40.00 per 1,000,000 gal. of treated water. The operating cost of $3.00 per 1,000,000 gal. of treated water in the main zeolite plant includes the cost of pumping, coagulating, filtering, and chlorinating the sea water required and also the cost of pumping the water through the pressure-type zeolite softening units.

The Main Zeolite Plant

The main zeolite plant consists of 8 fully automatic, pressure type vertical zeolite water softeners. Each unit is 14 ft. 0 in. in dia. by 14 ft. 0 in. in height in the straight side of the shell and is designed so that no ferrous metal comes in contact with the water.

These 8 zeolite units are arranged in 2 batteries of 4 units each. Each unit is controlled by an individual control panel, and each battery is equipped with a Bailey recording meter to act as a master control and to furnish a permanent record of the output of the plant.

Operations Automatic

All of the operations—softening, combined backwashing and regenerating, and rinsing—are automatically carried out by means of hydraulic valves actuated by a master pilot valve control. The main zeolite plant is also arranged so that the 2 softener batteries start and stop synchronously with the raw water pumps whose operation is controlled, through

Foxboro level controllers by the level of the water in the soft water storage tanks.

The operation of the units in each battery are staggered so that, when one unit is being regenerated, the other 3 units of the battery are on the softening cycle. This method of operation plus the use of soft water storage assures a constant supply of soft water. Furthermore, the control cabinets for each softener battery use storage battery electric current to actuate the control mechanisms and relays, so that a power failure will not affect their functioning to completion on any partially started cycle of operations for any particular softening unit.

The Cycle

The cycle with any unit of the battery is as follows:

1. The pretreated raw water is softened by simply flowing it downwardly through the zeolite bed in the unit.

2. At the end of the softening run, the unit is automatically cut out of the battery and automatically backwashed and regenerated, simultaneously, by an upward flow of the correct volume of chlorinated, coagulated, and filtered sea water at a controlled rate of flow for a controlled period of time.

3. At the end of this period, the softener unit is automatically rinsed downwardly by a controlled flow of fresh water for a controlled period of time. This serves to flush all traces of sea water and by-products to the sewer.

4. After the zeolite bed has been thoroughly rinsed, the softener unit is automatically restored to service, ready to soften a further equal quantity of water on the next softening cycle.

Results Obtained

The results obtained are shown in the following table:

ANALYSES OF RAW, DEGASIFIED AND SOFTENED WATER
Showing changes in hardness, H_2S and CO_2

	Raw p.p.m.	Degasified p.p.m.	Softened p.p.m.
Total hardness as $CaCO_3$	312-340	312-340	0
Hydrogen sulphide as H_2S	3.5-3.7	0.1-0.3	0
Carbon dioxide as CO_2	8- 20	9- 13	9- 13

Boiler Feedwater Softening Plant

The boiler feedwater is treated separately in a plant consisting of a lime pretreatment plant furnished by Infilco and an automatic battery of 3 Zeo-Karb softening units. The lime pretreatment serves to reduce the bicarbonate hardness. The lime-treated water is then filtered and recarbonated and passed through the Zeo-Karb water softeners which serve to remove the remaining hardness.

Zeo-Karb was employed because, being a non-siliceous carbonaceous zeolite, its use eliminated any possibility of silica pickup. This Zeo-Karb softener battery operates on the sodium cycle, using the chlorinated, coagulated, and filtered sea water for regeneration. As the operation of this battery is similar to that of the main plant, a detailed description of its operation is unnecessary.

Seawater Filtration Plant

As both the zeolite units in the main zeolite plant and those in the boiler feedwater treatment plant are regenerated with the saline water obtained from the Amelia River, the equipment having to do with this saline water is, in reality, a very necessary part of both plants and so is treated as a separate section of this paper, which follows:

Bingham deep well turbine-type pumps, in duplicate, are installed in the sea water intake structure which is built on piles and located at the outer edge of the main mill dock in the Amelia River. These pumps are trimmed with KA_2SMo as a corrosion preventive measure.

A chlorinator and an alum feeder are installed in the sea water intake structure to deliver chlorine and alum to the suction of whichever sea water pump may be on the line (selection is at the option of the plant operator).

The saline water is pumped from the sea water intake structure to the sea water filters through a 12 in.-line consisting of Transite pipe hung under structures and cement-lined cast iron pipe laid in open terrain. This 12 in.-line has a surge eliminator valve and accessories located in the intake structure to prevent line or joint breakage which might occur, when the sea water pumps are suddenly started or stopped.

The saline water (with chlorine and alum added) is pumped to and through 3 sea water filters (horizontal shell, pressure type) located at one end of the main zeolite plant building. After being filtered the saline water is used to regenerate the various zeolite units. An elevated sea water storage tank "floats" on the line after the filters and serves to maintain constant pressure as well as sufficient quantity of saline water to take care of the varying demands of the different softening units.

The sea water filters are entirely automatic in operation, the backwashing of any unit being accomplished with the filtered water from the other units. The automatic controls are similar to those used on the zeolite softening units. Furthermore, the sea water pumps and the sea water filters are interconnected through control circuits so as to automatically start and stop when the filtered saline water reaches certain predetermined levels in the sea water storage tank.

Conclusions

When the use of sea water regenerated zeolite units was first proposed by the engineers, the precedent for the suggestion was founded upon the successful operation of the Sarasota, Fla., municipal water softening plant. The Sarasota plant embodies the principle of regeneration of zeolite units with sea water *(1)*, and this installation served in reality as a pilot plant on which actual tests-in-operation were made; which tests indicated that the exacting requirements of a rayon pulp mill could be met, as contrasted with the more lenient requirements of a water softened for general use in a municipality.

The Fernandina mill water treatment plants of Rayonier, Inc., were tested out and placed in normal service the latter part of November, 1939, and the actual results are even better than those originally anticipated. The Fernandina mill installation proves that it is possible to obtain this soft water at an extremely nominal cost of plant operation, especially when sea water is available for the regeneration of zeolite units.

Literature Cited

(1) Richheimer, C. E. *J. Amer. Water Works Assoc.* 29, no. 11:1712-1721 (Nov., 1937).

Pacific TAPPI Discusses Sulphite Liquors

With 91 members and friends in attendance the Pacific Section of The Technical Association of The Pulp and Paper Industry concluded another in its series of monthly meetings. The dinner and program was held at the Heathman Hotel, Portland, Ore., with F. A. Olmsted, Vice-Chairman, presiding. Having just returned from the TAPPI meetings in New York Mr. Olmsted was able to convey to the local section comments regarding subjects discussed in the east and the fine response given by delegates. He mentioned also the noticeable interest shown in the Fall Meeting, to be held in Seattle, Wash. in August. It was urged that this interest be encouraged by members of the local section urging their friends in other localities to commence making plans to be in attendance.

Of the two papers presented was one by Leo Friedman, Assistant Professor of Chemistry, Oregon State College, Corvallis, entitled "Recent Advances in the Chemistry of Lignin". It was pointed out that lignin was the only large source of available aromatic compounds outside of the coal tars. At present the lignin is being thrown away and the greatest efforts now are in devising means to burn it.

"A Routine Test for the Organic Matter in Sulphite Liquors" was the title of a paper presented by Cecil L. Triplett of the Hawley Pulp & Paper Company, Oregon City, and represents the first paper to be offered this term in competition for the Shibley Award. He mentioned that while at present sulphite cooking liquors are evaluated by determining the total, free and combined sulphur dioxide, in a sulphite system where liquid and gaseous reliefs from the digesters are returned to the acid supply system, it is possible for organic matter to accumulate in the acid system. The purpose of the paper is to present a routine method for the determination of the organic matter in sulphite liquors, with no attempt being made to show the relation of the organic matter to the quality of the pulp produced. Prefacing his report on the subject under discussion, Mr. Triplett stated—"This work was started in 1938, when for periods of several days duration the routine chemical analysis of the cooking liquors failed to correlate with the Baume. At these times the chemical tests would indicate a decline in the acid strength; however there would be no corresponding change in the Baume of the acid. Qualitative tests made on samples of the acid indicated large amounts of organic matter".

Those in Attendance

Following is a list of those in attendance at the meeting.

C. E. Ackley, B. R. Adams, Gerald Alcorn, Leslie L. Anderson, D. B. Armstrong, John Ashby, A. J. Bailey, Geo. D. Bailey, W. M. Bain, Lee C. Baltzelle, Chester Beals, C. H. Belvin, S. B. Biddle, Jr., Homer H. Best, Bernard Bornstein, A. M. Cadigan, R. E. Chase, Jr., Claud Christiansen, W. W. Clarke, J. V. B. Cox, R. E. Dana, R. T. Dickie, C. A. Enghouse, Lloyd R. Ewing, Carl Fahlstrom, Francis W. Flynn, Leo Friedman, Harry Fromong, Howard B. Gerber, Wm. R. Gibson, C. H. Graham, T. H. Grant, David C. Greeley, R. B. Haight, R. N. Hammond, Joh F. Hart, H. A. Hauff, Jan Haugerod, Albert H. Hooker, Jr., C. W. Jacoby, L. T. Johnson, Herman Jorgensen, W. A. Kelly, Ernie Kertz, Robert B. Kirkwood, Robert Lovin, D. K. MacBain, Robert W. Martig, C. R. McCully, G. N. McGregor, Roy R. Miller, T. E. Moffitt, T. H. Moran, George Nelson, M. E. Norwood, Ross O'Brien, F. A. Olmsted, Gus Ostenson, E. T. Parker, Jr., Morris M. Peterson, Paul A. Pittenger, Albert S. Quinn, E. D. Rich, E. J. Roake, Cass B. Roberts, H. L. Rudow, J. M. Ruck, Rex Russell, Jack V. Savage, B. W. Sawyer, Harlan Scott, Chas. M. Server, W. J. Shelton, Brian Shera, D. L. Shirley, L. E. Stevenson, C. F. Stevey, Franz Sturm, A. C. Salisbury, Earl G. Thompson, Cecil R. Triplett, R. M. True, Preston Varney, G. R. Vernig, R. D. Waddell, Harold C. Wall, Fred J. Weleber, Jack Wilcox and Edward P. Wood.

New England TAPPI Discusses Rosin

About seventy-five members and affiliates of the New England Section of the Technical Association of the Pulp and Paper Industry attended the dinner meeting held at the Roger Smith Hotel, Holyoke, Mass. on Friday, March 15, 1940. Randall H. Doughty of the Fitchburg Paper Company presided as chairman.

The principal speaker was E. A. Georgi of the Papermakers Chemical Division, Hercules Powder Company, Wilmington, Delaware who outlined the objectives and methods of rosin chemistry research. Dr. Georgi described the time consuming effort that has been made in establishing the structure of the constituents of rosin. These now appear to be abietic acid and d- and l- pimaric acids (the latter not being true isomers). The unsaturated nature of these acids, due to the presence of double bonds has presented many difficulties in the past but a stabilized rosin (saturated) is now available and should find use in papers requiring permanence.

An interesting discussion followed this presentation by Mr. Georgi.

The next meeting will be held at the Webber Duck Inn, Wrentham, Mass. on April 26. This will be preceded by a visit to the mill of Bird and Son, E. Walpole, Mass. Cylinder machine operation will be the subject of discussion.

Among those present were:

P. S. Bolton, P. S. Barnhart, H. T. Barker, R. G. Betts, R. F. Blount, R. T. Bingham, J. C. Barthel, D. K. Bartlett, Jr., J. M. Behnke, L. A. Barker, A. B. Copping, F. C. Clark, Harry Duston, R. H. Doughty, C. J. Enemark, R. D. W. Ewing, W. L. Foote, F. J. Flaherty, A. F. Gilmore, E. A. Georgi, J. J. Healy, Jr., C. C. Irving and Mrs. Irving, J. P. Kennedy, C. H. Kent, Werner Kaufmann, H. U. Kiely, C. F. Kirby, C. G. Landes, R. M. Leighton, R. G. Macdonald, M. J. Maguire, H. R. Miller, D. J. MacIntyre, W. A. Niviling, A. W. Neubauer, E. O. Nash, F. F. Norman, R. B. Porter, Jr., E. A. Radant, E. C. Reid, F. W. Schneider, L. W. Smith, T. I. Stirling, Russell Shaw, F. A. Strovink, J. J. Thomas, Roy Tewksbury, T. R. Weymouth, E. A. Weymouth, L. M. Yoerg.

Performance of Sodium Silicate Adhesives in the Manufacture of Corrugated Fiberboard*

By E. R. Boller[1], J. G. Lander[2], and R. Morehouse[3]

Abstract

In the production of corrugated fiberboard, the efficiency of the manufacturing operation and the quality of the finished product are determined both by the quality of raw materials used and by the engineering practices employed. Optimum performance, with regard both to production and quality, requires good materials and good engineering. The properties and characteristics of the materials must be understood if good engineering is to be achieved and, conversely, the consequences of various engineering practices must be appreciated to obtain the most from the raw materials. In the past, the separate effects of materials and engineering have often been confused. In this paper, sodium silicate adhesives are considered in connection with the other raw material, paperboard, and the more pertinent engineering factors. It is believed that in this way the contribution of the adhesive to the overall efficiency of the corrugated fiberboard manufacturing operation can be appreciated and distinguished from the contributions of the paperboard and of the engineering practices.

General Properties of Sodium Silicate

Sodium silicate adhesives are delivered at the boxboard plants either in solution or in anhydrous form. Silicate solutions are ready for use when received and conform to close specifications on composition and properties. These solutions may be stored for long periods of time in closed steel or concrete tanks at atmospheric temperatures without any change in physical or chemical properties. Silicate adhesives are easily transferred within the corrugating plant by pumping. There are a number of arrangements suitable for supplying the silicate adhesive to the corrugating machine, and in no case is any complicated or expensive equipment necessary. Methods for supplying silicate to the corrugating machine are quite flexible largely because the silicate is not injured by the temperatures to which it must normally be exposed. This permits the design of an adhesive supply system which will fit each particular plant.

Sodium silicate is manufactured from sand and soda which are available at low cost in unlimited quantities. For this reason the cost of silicate adhesives to the boxboard manufacturer is low and is not subject to frequent fluctuations.

By virtue of its unique properties, sodium silicate has proved itself admirably adapted as an adhesive for the manufacture of corrugated fiberboard. Its physical properties, such as viscosity, are well suited for mechanical transference to the paper and for the formation of an adhesive bond under the requisite conditions. The quick-setting characteristics of silicate adhesives have made possible the high operating speeds of modern corrugating machines. At the same time, the silicate produces a strong bond and of itself contributes to the strength of the assembled board *(1)*. Sodium silicate will perform as an adhesive with an extremely wide range of temperatures, speeds, types of paperboard, and mechanical conditions on the fabricating machines, thus permitting an extraordinary degree of flexibility in the combining operation.

Sodium silicate should not be regarded as a simple chemical compound. Rather it should be considered as a colloidal system. Within a wide range the ratio of silica to soda may be varied continuously with a corresponding change in the physical and chemical properties of the product. Variations in properties can be obtained by changes in temperature and concentration of the silicate solutions in a manner typical of colloidal systems. For these reasons, it is possible to design a silicate solution which will meet almost any adhesive requirement.

Adhesive Properties of Sodium Silicate

Sodium silicate forms an adhesive bond by loss of water. It is characteristic of a silicate solution that its viscosity, or cohesive strength, increases with concentration. When a certain concentration is reached, the increase in viscosity becomes extremely rapid, and the solution changes first to a tough plastic mass and finally to a firm solid. This phenomenon is shown in Fig. 1, and this figure indicates the viscosity-concentration relationship for a sodium silicate solution commonly used as a paperboard adhesive. It will be noted from this curve that when the concentration of the solution reaches a certain value, the removal of a relatively small amount of water causes an enormous increase in viscosity. It is upon this fact that the quick-setting characteristics of silicate adhesives depend.

The concentration of a sodium silicate solution at which there is a rapid increase in viscosity with loss of water corresponds to the point of sharp inflection on the curve shown in Fig. 1. This critical concentration varies directly with the temperature of the silicate, being higher for higher temperatures. The critical concentration also depends upon the composition of the particular silicate solution, varying inversely with the silica-soda ratio. The sharpness of the viscosity increase with loss of water is not so

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* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 19-22, 1940.

[1] E. I. du Pont de Nemours & Co., Grasselli Chemicals Dept., Cleveland, Ohio.

[2] Diamond Alkali Co., Standard Silicate Div., Pittsburgh, Pa.

[3] Member TAPPI, Engineer, Philadelphia Quartz Co., Philadelphia, Pa.

marked with sodium silicates having a relatively low silica-soda ratio.

The increase in viscosity of sodium silicate solutions with loss of water leads to the formation of a plastic-like solid. The cohesive strength of this solid likewise increases with dehydration. The relation between cohesive strength and water content of a representative adhesive silicate is illustrated in Fig. 2. Indications are that a cohesive strength of 2 lb. per sq. in., or slightly less, is sufficient to tear the paper when a corrugated bond is pulled apart. The ultimate tensile strength of the silicate when completely dried is about 750 lb. per sq. in. which is many times that of the paper *(2)*.

The viscosity of silicate solutions increases rapidly with decreasing temperature. This relationship for a representative adhesive silicate is shown in Fig. 3. The temperature effect on viscosity is greatest with silicates having reduced water content. This is shown by the data in Table I. In this table the viscosity of a commonly used 3.25 ratio silicate solution at 25 deg. C. is taken arbitrarily as unity, and the viscosities shown for other temperatures and concentrations are relative to this.

TABLE I.—VISCOSITY-TEMPERATURE-CONCENTRATION RELATIONS OF 3.25 RATIO SODIUM SILICATE

Concentration %	Condition	Water removed %	Rel. viscosity 25 deg. C.	Rel. viscosity 60 deg. C.	Ratio $\frac{V_{25}}{V_{60}}$
38.7	Fluid	0	1	0.03	33
40.2	Viscous	4	14.6	0.18	81
43.4	Plastic	11	19,000	49	400

These data suggest that the setting of sodium silicate solution to form an adhesive bond can be assisted by reduction in temperature after sufficient water has been removed. In other words, within a certain range sodium silicate acts as a thermoplastic material.

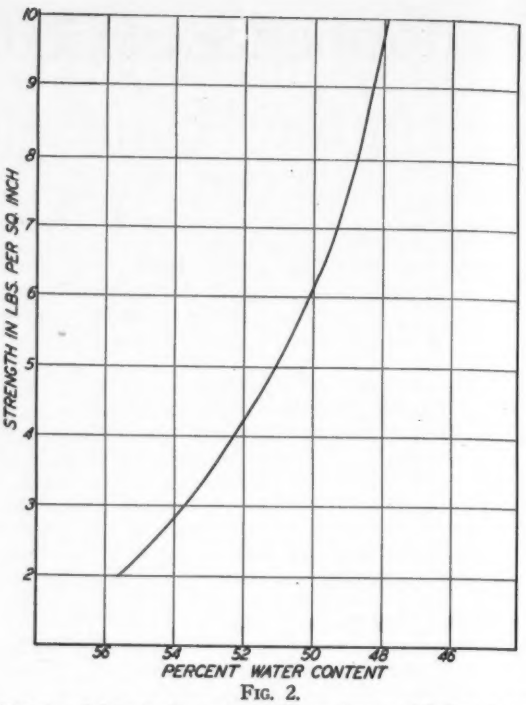

FIG. 2.

Variation of Cohesive Strength with Water Content of Sodium Silicate at 3.25 Ratio.

There are two means by which water may be removed from the silicate solution to cause setting of the adhesive bond. The water may be lost by evaporation to the atmosphere or absorption by the paper.

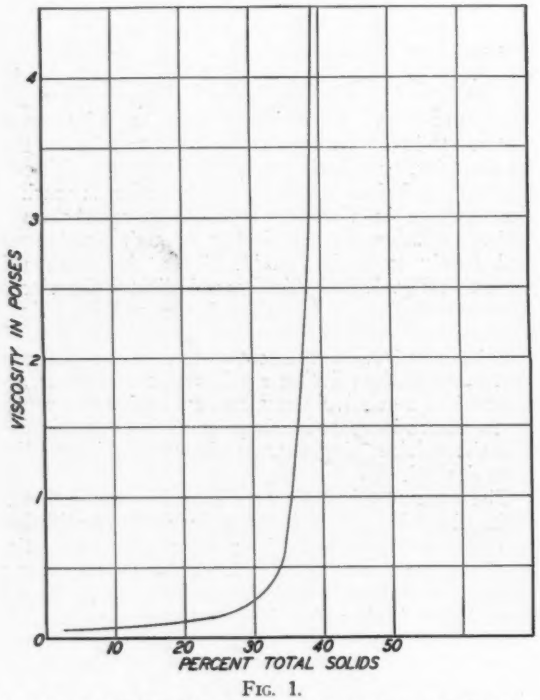

FIG. 1.

Variation of Absolute Viscosity with Total Solids 3.25 Ratio Sodium Silicate Solution.

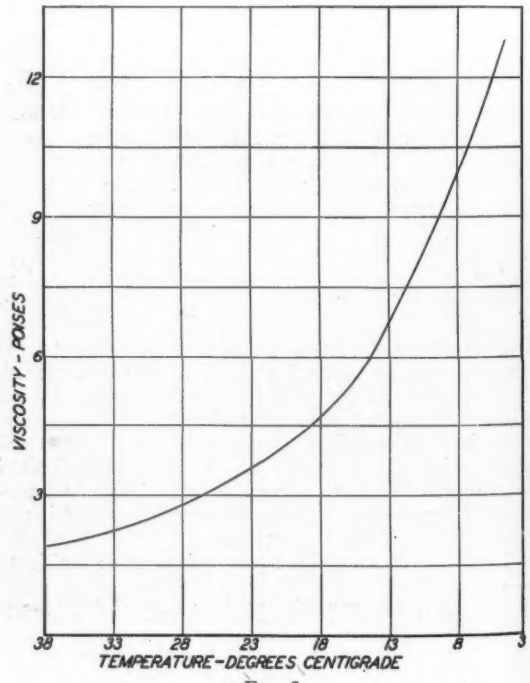

FIG. 3.

Variation of Viscosity of 3.25 Ratio, 41.3 deg. Bé Sodium Silicate Solution with Temperature.

While no definite data are available on this point, it seems probable that absorption by the paper is the more important factor in securing preliminary set of the adhesive bond on the machine; and evaporation, especially by diffusion through the board, is the more important in obtaining final set of the bond. High temperatures promote loss of water from the silicate adhesive, both by evaporation and absorption by the paper. The rate of absorption of water by the paper stock is also influenced by the characteristics of the particular stock being used and by its moisture content. The fact that high temperatures are not critical in securing formation of the silicate bond means that in corrugating practice it is unnecessary to heat the board to a point which would be injurious to certain paper stocks.

Composition of a sodium silicate solution, that is, the silica-soda ratio, is quite important in determining its adhesive properties. As indicated above, the change in viscosity of a low ratio silicate solution is much less abrupt than with a high ratio solution. For this reason, the former will show an appreciably slower setting rate. This difference is accentuated also by the lower rate of water evaporation from the low ratio and more concentrated solutions. Sodium silicate having a ratio of about 2.8, shows the greatest cohesive strength. Silicates having a high ratio, as 3.5 or above, exhibit rather low cohesive strength until they are thoroughly dried. It has been found from consideration of all factors that silicate solutions, having a ratio of from 3.15 to 3.35, are satisfactory for use with modern corrugating machines. In most cases, the preferred range is from 3.2 to 3.3. The most satisfactory concentration for silicate adhesives corresponds to gravities from 40.0 to 42.5 deg. Bé at 60 deg. F. The most satisfactory concentration within this range will depend upon the particular conditions existing at any given plant.

Within the past few years, considerable attention has been given to adhesives consisting of clay dispersed in sodium silicate solutions. The addition of

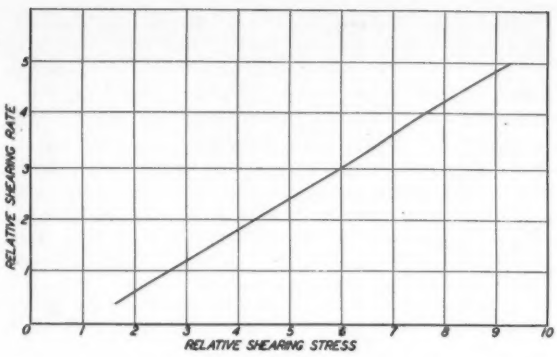

FIG. 4.
Rheological Curve for A Silicate-Clay Adhesive.

the clay does not markedly change the adhesive properties of sodium silicate, but it does increase somewhat the effects of both concentration and temperature on the viscosity. The greatest influence of the clay addition is on the rheological characteristics of the silicate solution. A silicate solution behaves essentially as a truly viscous liquid. A silicate-clay suspension shows marked plasticity. This is shown by the rheological curve in Fig. 4 for a representative silicate-clay adhesive. The plasticity of silicate-clay adhesives is reflected in their flowing and penetrating characteristics.

Bond Formation

The mechanical principles of the corrugating machine determine the manner in which the adhesive bond of corrugated fiberboard must be formed. The silicate adhesive is applied by means of a transfer roll to the tips of the flutes on one side of the board, the liner pressed against the adhesive covered flutes and the bond subjected to temperature and pressure. After a few seconds, the same process is repeated on

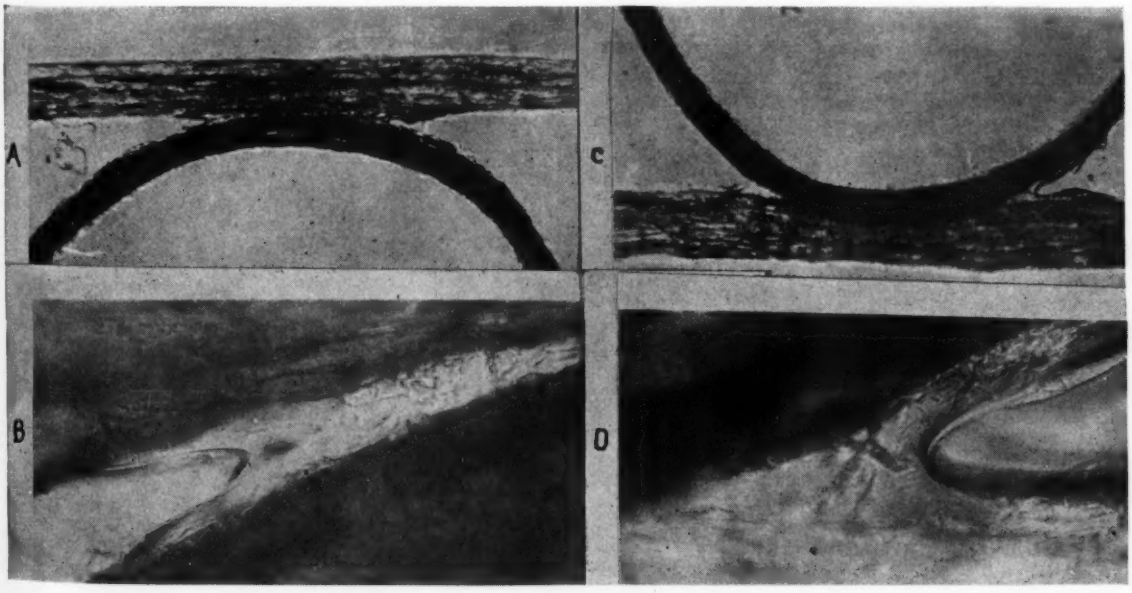

FIG. 5.
A-B Double-Backer Bond with Silicate Adhesive Film between Corrugated and Flat Sheets. C-D Single-Facer Bond with Silicate. Corrugated Member Depressed below Liner Surface..

the other side of the board. With the more modern machines, the whole operation may be completed within 10 to 15 seconds. At the end of this time, the adhesive bond must be sufficiently strong to hold the components of the board together when subjected to ordinary handling. Silicate adhesives set to a bond having the required strength within this time by the mechanism described above.

The physical configuration of the adhesive bond is quite important. Thorough examination of a large number of corrugated board specimens has indicated that it is not sufficient to have just a thin film of adhesive at the line of contact between the corrugating medium and the liner. A good bond should have an excess of silicate at either side of the line of contact, forming shoulders which act as reinforcements. Furthermore, the overall strength of a bond will be directly proportional to the width of the adhesive strip in contact with both plies. An adhesive strip less than 1 mm. wide is seldom satisfactory and a width of 2 mm. is preferable.

Satisfactory adhesive bonds are shown in Fig. 5 and 6. Figure 5 shows photomicrographs taken at magnifications of 22 and 144. Fig. 6 represents enlargements of x-ray photographs of silicate bonds taken by a procedure previously described in the literature *(3)*. In the latter case, the silicate, when present in the paper at a concentration of 5 per cent or more on the basis of the paper weight, shows black on the photograph and the paper shows gray. In both Fig. 5 and Fig. 6, nonpressure type bonds are shown at the left and pressure type bonds at the right. These photographs illustrate the structural characteristics of the two bond types. The photographs show that the adhesive bond consists of a thin layer of adhesive between the corrugating medium and the liner, of shoulders at either side of the area of direct contact and of a film of silicate spread along the surface of the paperboard beyond the shoulders. It is interesting to note that in many cases the shoulders are hollow, though this is not at all necessary for a good bond. In general, the strongest bonds are those which approach closely the configuration shown in these photographs.

In order to obtain bonds of the desired form, it is necessary that the silicate adhesive applied by the transfer roll to the tips of the flutes remain in position on the flutes until brought into contact with the liner; likewise it is necessary that the silicate which is squeezed to either side of the flute tip remain in position when the bond is formed with the liner. This means that the adhesive must be sufficiently viscous or plastic that it will not flow away from the tips of the flutes in the fraction of a second between its application and the formation and setting of the bond. In practice, this is readily accomplished either by using a sufficiently viscous silicate solution or a more dilute solution containing clay. The ease with which the silicate solution flows over the tips of the corrugations is also influenced by the characteristics of the particular paper, especially by the rate at which it absorbs water from the silicate. Fig. 7 is an x-ray photograph of a board made with a highly fluid silicate, showing the manner in which, on the double-face bonds, the silicate has spread away from the point of contact, completely eliminating the shoulders and producing a board in which the double-face liner could be readily snapped from the corrugations. In the case of a pressure-type corrugating machine, it is usually possible, though not common practice, to employ a more fluid adhesive on the single-facing unit than on the double-facing unit without sacrificing entirely the desired characteristics of bond structure. This is probably due to the much shorter time interval between application of the adhesive and formation of the bond in the single-facing operation, and to the higher temperature and positive pressure attending formation of this type bond. However, the use of

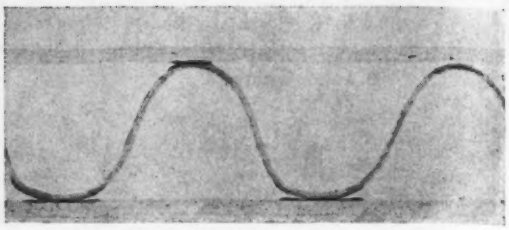

FIG. 7.
Silicate Too Thin, Causing Flow Away from Points of Contact.

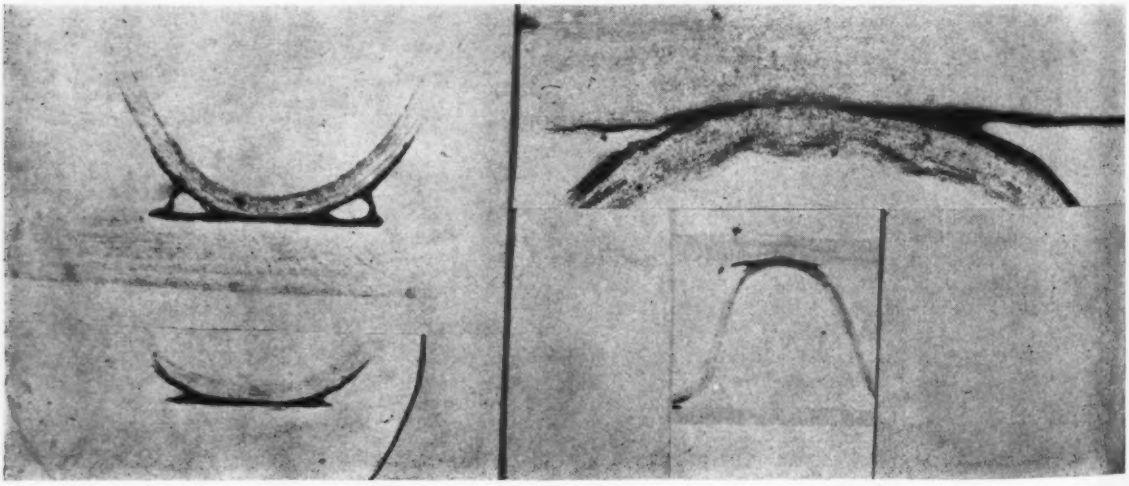

FIG. 6.
X-ray Views of Satisfactory Silicate Bonds. Double-Backer Left, Single-Facer Right.

excessive pressure, which is sometimes used instead of proper adjustments to secure bonding, injures the single face liner and impairs the quality of the board.

Examination of the bond in Fig. 5 shows an appreciable penetration of the silicate into the paper. This is particularly important in securing good adhesion between the paperboard and the silicate. This desired degree of penetration, 0.001 to 0.002 in., can be regulated by proper control of the adhesive, the paperboard, or both. Penetration of the silicate is favored by low viscosity; this can be obtained either by increasing the water content, by selection of proper commercial grade, or by raising the temperature. Penetrability of the paperboard can be increased by raising its moisture content, as by steaming during the corrugating operation. Penetration of the silicate may also be obtained by any change that slows its setting rate, permitting it to remain in fluid state for a longer period.

On the other hand, it is necessary to avoid too great penetration of the adhesive into the paper. If penetration is excessive, a considerable portion of the silicate is pulled away from the adhesive bond, producing a bond which is narrow, has no shoulders and is consequently quite weak. Extreme examples of this condition are produced by the use of paperboard which is too damp. An x-ray photograph illustrating the weak bonds produced by too great penetration into wet liners is shown in Fig. 8. Excessive penetration may be avoided by the reverse of the means noted above for securing penetration, i.e., by increasing the viscosity of the adhesive, reducing the moisture content of the paper, or speeding up both preliminary and final setting time of the adhesive. In some instances, very damp paperboard, 12 to 15 per cent moisture, has been fabricated by using a highly viscous adhesive, as a 42.5 deg. Bé solution of 3.25 ratio silicate, or by using a plastic adhesive, as a silicate-clay suspension.

With many types of corrugating machines, there is an appreciable lapse of time between the formation of the single-faced bonds and formation of the double-faced bonds. During this time, the single-faced board should be handled in such a manner that the moisture from the adhesive on the single-faced side will have an opportunity to be dissipated. This loss of moisture may often be accelerated by blowing warm air over the single-faced board. It is also essential that the single-faced board be protected from the steam and water vapor from the single-facing unit. If the single-faced board is subjected to adverse conditions, there is a considerable increase in the moisture content of the corrugating medium, and it is often difficult to secure satisfactory bonding on the double-faced side.

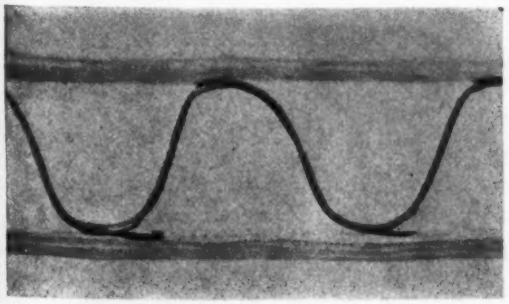

FIG. 8.
Abnormal Penetration Due to Wet Liners.

It is possible to secure bonds of fairly satisfactory structure in many cases with fairly deep penetration of the silicate, especially when an excessive amount of adhesive is used. Although the bond strength may be entirely adequate, such practice may produce other undesirable effects. Sodium silicate is an alkaline material, and if it penetrates through the liner it will produce a discoloration on the exterior surface. It has been shown that if excessive penetration is allowed to occur during formation of the adhesive bond, the probability of subsequent migration of the alkali to the exterior surface of the liner, under such conditions as extremely high humidities, is much greater than when the adhesive bond is formed with the optimum degree of penetration for the silicate. This phenomenon is also accentuated by use of an excessive quantity of adhesive. In practically all cases, this alkali staining can be avoided by proper control of penetration and the amount of adhesive during the fabricating process, and in good practice neither undue penetration nor staining occur.

The methods used for controlling penetration of the adhesive into the paper during the formation of the bond are useful in promoting the setting rate of the silicate. The silicate solution showing optimum penetration for any given paperboard combination is usually the one which will set most rapidly. The paperboard having a moisture content permitting optimum penetration of the silicate will absorb water from the silicate adhesive most rapidly. It should be noted that proper control of penetration produces bonds of maximum strength.

Silicate bonds of satisfactory quality can be formed under a wide range of conditions. The procedures suggested above are those for securing optimum results, but considerable departure from these is possible without the production of low quality board. It is not necessary that any critical temperature be attained during bond formation in order to set the adhesive. A silicate adhesive, as previously indicated, sets by loss of a small proportion of water and this can occur just as well at room temperature as at an elevated temperature. The use of elevated temperatures in the manufacture of corrugated fiberboard merely permits a higher rate of production. If, for some reason, the silicate bond has not formed at the time the board comes from the machine, it will set in the stacks. While best results can be secured by careful control of the operating conditions, silicate adhesives permit operation under adverse conditions when this is necessary.

From this discussion on adhesive characteristics of sodium silicate and of bond formation with silicate adhesives, it is apparent that the fabrication of corrugated fiberboard is influenced at least as much by mechanical factors and properties of the paperboard as by the characteristics of the silicate. In view of this it seems appropriate that the effect of these other factors, particularly the mechanical equipment, be considered in connection with the apparent performance of the adhesive. The overall performance of an adhesive in a corrugating plant can perhaps best be understood by considering it in connection with these other factors as regards efficiency of the operation and quality of the product produced.

Mechanical Adjustments

Application of the Adhesive

Uniform application of the adhesive constitutes one of the most important requirements for its satisfactory performance. Consideration of the structure of corrugated board will indicate clearly the desirability of uniform application of the silicate both from bond to bond and along the individual bonds. Figure 9 shows an x-ray photograph of a flat section of corrugated board on which the silicate adhesive has been properly and uniformly applied. This is a photograph of a board produced on a pressure-type machine, the single-face bonds showing as pairs of parallel dark lines and the double-face bonds as broad dark bands. Figure 10 is an x-ray photograph of another flat section of corrugated board showing spotty application of the silicate.

Causes of Nonuniform Application

Breaks of any kind in the silicate bond, or presence of weak bonds, are sources of weakness in the corrugated board. When corrugated boxes are subjected to compression tests, the failures invariably start at the breaks or points of weakness in the adhesive bond. The quantitative effect of this lack of uniformity is proportional to the area over which there is weak or no adhesion. The number and size of these deficiencies in the adhesive bond depend upon a number of factors including the type of machine, manner in which it is operated, and properties of the adhesive. Common causes are transfer roll out of round, nonuniform adjustment of the doctor roll regulating the thickness of adhesive film on the transfer roll, worn and nonuniform corrugating rolls, use of too little adhesive, and use of an adhesive having either too great or too low a viscosity. In cases where the available equipment is badly worn and cannot be adjusted to eliminate such nonuniformity of the adhesive bond, the situation can be remedied in part by applying a larger amount of silicate adhesive or by using a silicate having a fairly high viscosity. This procedure is especially effective in overcoming the irregularity due to high and low corrugations

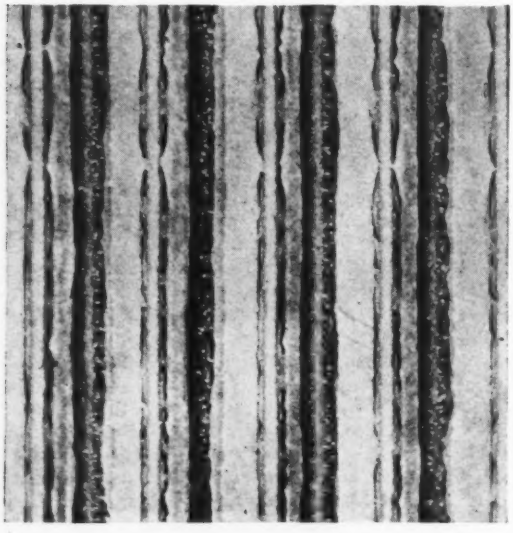

Fig. 9.
Good Distribution of Adhesives. X-ray View.

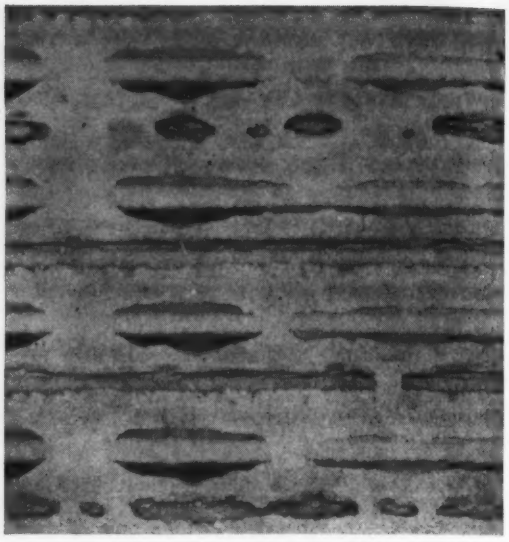

Fig. 10.
Faulty Distribution of Silicate by Mechanical Defects. X-ray View.

which are often produced by worn corrugating rolls. The application of a sufficient amount of a fairly viscous or plastic silicate adhesive allows the adhesive to stand up to sufficient height on the low flutes to form contact with the liner. This procedure is much preferable to that sometimes followed which involves using an adhesive having a high water content, the excessive water softening the tips of the flutes and permitting crushing of the high ones down to the level of the low ones during formation of the double-face bond with consequent impairment of the strength characteristics of the finished board. The above suggested procedures are an indication of the flexibility in the performance of silicate adhesives and of the manner in which they may be manipulated to supplement the available mechanical equipment.

Nonuniformity in the application of silicate, areas which are bare or deficient in amount of adhesive, is a frequent cause of blisters on the board coming from the machine. In these instances the blisters can often be suppressed by reducing the speed of the machine. It would seem preferable to eliminate the cause of the difficulty by adjustments necessary for uniform application of an adequate quantity of silicate.

Transfer Roll Clearances

Emphasis should be placed on control of clearances on silicate transfer rolls which regulate the amount of adhesive applied. The optimum settings for any particular case can be determined by a little experimentation. Experience has shown the necessity for making these adjustments to a thousandth of an inch and for checking the adjustments with a suitable gage at least once a day.

It is important that the silicate adhesive bond be uniform in cross section. The bond shown in Fig. 6 may be regarded as approaching the ideal in this respect. A greater amount of silicate on one side of the bond than on the other, or the complete absence of silicate from one side of the bond in extreme cases, produces nonuniformity in the strength of the bond. Obviously the bond will be stronger when pulled in one direction than the other. Some of the reinforcing action of the silicate in increasing the stiffness

and rigidity of the corrugated board is sacrificed by such lack of symmetry. A frequent cause of this is lack of synchronization between the board speed through the machine and the peripheral speed of the adhesive transfer roll. In many cases, with pressure-type corrugating machines, a certain lack of symmetry seems to be unavoidable on the single-face bonds.

The fingers on many pressure-type corrugating machines tend to produce lines bare of adhesive. If the finger lines are fairly wide, they represent a point of definite weakness in the corrugated board. An example of such wide finger lines is shown in Fig. 10. The width of these finger lines can be greatly reduced and in many cases largely eliminated by accurate setting of the fingers and replacement of those which are bent or worn. Cleanliness is quite important in avoiding wide finger lines.

Tension on the Board Components

To secure optimum performance with a corrugating adhesive, it is important that uneven tension on the components of the board be avoided. Such a condition is frequently encountered during the formation of the double-face bonds. Uneven tension often results in slippage of the double-face liner with respect to the single-face board and consequent smearing of the adhesive over the surface of the double-face liner. This produces a nonsymmetrical bond having more silicate on one side than on the other and usually a bond with insufficient silicate near the point of contact, representing essentially a waste of a portion of the adhesive applied. It is characteristic of silicate adhesives that a fairly satisfactory bond is secured, and board can be made with a considerable amount of slippage, although the quality of the bonds and of the finished board is not as high as it should be. Uneven tension on the components of board will, in severe cases, produce warping of the finished corrugated board in the machine direction.

After the silicate adhesive has been applied to the tips of the corrugations and the liner has been brought into contact with them, it is desirable that such contact be maintained and undue stresses on the bond be avoided until a preliminary set is obtained. Instances have been noted with double-facing operations in which contact between the liner and the flutes was broken and re-established several times due to improper mechanical arrangement for combining the single-faced board and double-face liner. Because of the quick-setting characteristics of silicate adhesives, such a procedure permits the silicate to dry on both the liner and the corrugating medium without the establishment of an adhesive bond; or the silicate sets to a solid which is subjected to sufficient stress to cause fracture before it has dried sufficiently. The x-ray photograph in Fig. 11 shows the character of bond resulting from this practice. Obviously bonds of this character are unduly weak. This difficulty is most often encountered with heavy linerboard.

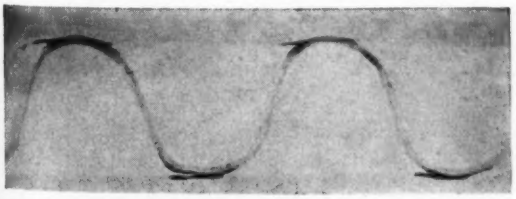

Fig. 11.
Adhesive Allowed to Set with Inadequate Contact between Corrugated Sheet and Liner. Mechanical Defect.

Distortion of the Fluter

The flutes in corrugated board have been carefully designed to give maximum strength and rigidity to the finished board. Any distortion, breaking or crushing of these flutes necessarily impairs the strength of the product. The flutes of corrugated board must withstand considerable stress at various points in the board making operation. Much of the resultant danger of injuring the flutes is avoided with silicate adhesives. As pointed out above, it is necessary to remove only a small proportion of water from the usual silicate adhesives in order to secure a bond. The corrugating material does not absorb sufficient water from the silicate adhesive to permit lowering of its strength to a point where it can be crushed or otherwise injured by normal boardmaking operations. If the water content of the adhesive is unduly high, there is sufficient absorption of water by the corrugating medium that it is almost impossible to avoid distortion of the flutes.

Removal of Silicate from Machine Parts

Sodium silicate is an excellent adhesive for many materials other than paper. Consequently, if a silicate adhesive is allowed to come in contact with a hot metal surface, it will adhere quite tightly. Under certain conditions there may be an accumulation of such adherent silicate on the heating platens of the corrugating machine, which requires time to remove. There are several methods for avoiding or minimizing this difficulty, some of which are described below. Many types of corrugating machines are equipped with wipers which are adjustable to the width of the board and remove the silicate film from that portion of the transfer roll which contacts the outside eighth- to quarter-inch of the flutes. Normally this much of the board is trimmed, and there is no necessity for its being combined. This prevents the silicate flowing from the sides of the board and building up a ridge on the heating platens. The same result may be secured by inserting an adjustable metal shield between the transfer roll and the outside quarter-inch of the flute. The flow of silicate from the edge of the board before it has set can also be minimized by avoiding use of an excessive amount of silicate. Mechanical arrangements for lifting the pressure belts are valuable in giving ready access to the heating platens. It is also desirable to have the heating platens treated in such a way that the dry silicate film may be readily removed. It has been found possible to achieve this by coating the heating platen with colloidal graphite. *(4)* A dilute aqueous dispersion of the graphite is sprayed onto the hot platens at frequent intervals until a satisfactory coating is built up, and after that applied only sufficiently often to maintain this coating. The graphite coating is extremely adherent and does not discolor the bottom liner except for a few feet immediately after application. Dehydrated silicate does not adhere to the graphite and may be readily removed. There are a number of instances in which maintenance of a satisfactory graphite film on the heating platens has made them practically self-cleaning. It is interesting to note that in addition to preventing adhesion of the silicate, the graphite serves as a lubricating agent for the paper board, reducing the tension necessary to pull the board over the heat-

ing platens and reducing scuffing and peeling of certain types of linerboard.

Silicate Consumption

The optimum amount of silicate for combining corrugated fiberboard is rather variable. Consumptions are reported in regular production varying from 16 to 30 lbs. of silicate per M sq. ft. of "A" flute board have been noted. Probably any adhesive consumption coming within this range could be justified by special sets of conditions. With good practices the normal application is from 18 to 24 lbs. of silicate on average proportion of "A" and "B" flute board. With "B" flute board, the silicate consumption is generally from 15 to 30 per cent higher than "A" flute.

A somewhat smaller amount of a fairly fluid silicate is required than of a fairly viscous silicate for optimum operation on the machine. This is due both to use of a smaller volume and to the lower gravity of the more fluid material. However, this difference between grades of silicate adhesives is not great. The adhesive consumption necessary for satisfactory operation has also been found to vary with the kind of paperboard. A fairly heavy liner board, 30-pt. for example, requires somewhat more adhesive than a lighter board, as 12 to 16 point, both for optimum operation on the corrugating machine and for production of high quality board. The biggest factor in determining the optimum amount of silicate required is the mechanical condition of the corrugating equipment. In general it may be stated that the necessary silicate consumption is inversely proportional to the mechanical condition of the machine. The use of excessive quantities of silicate means that a greater amount of water must be evaporated or absorbed by the paper before the bond can be formed, this tending to increase time required for setting and to increase penetration of the silicate into the paper beyond the optimum degree. In most instances the minimum quantity of silicate which will permit formation of satisfactory bonds will give greatest machine speeds. The difficulties which may be encountered by use of excessive amounts of adhesive are more marked with a highly fluid silicate than they are with one which is fairly viscous. The consumption of much less than 18 lbs. of silicate causes nonuniform and spotty adhesion unless the equipment is in good mechanical condition. In most cases, consumptions below 16 lbs. are possible only with excellent equipment in conjunction with close control and supervision. It is often possible to improve strength characteristics of corrugated board to a significant extent by using an amount of silicate appreciably greater than the minimum necessary for satisfactory performance in the manufacturing operation, as 20-25 per cent beyond the minimum requirement. This additional silicate can be utilized without any undue difficulties in the operating performance of the adhesive.

The cost of the adhesive in the finished board is obviously a direct function of the amount used. A natural tendency is to reduce all costs, including that of the adhesive, to the minimum consistent with satisfactory operating performance and acceptable quality. It should be noted, however, that the cost of the adhesive is but a very small fraction of the total cost of corrugated board, approximately 2 to 4 per cent. Any improvement, either in operating performance or in quality of the product, which can be secured through the use of an amount of silicate above the bare minimum is probably cheaper than a like improvement secured by any other means.

Production Speed

The advances made in production rate of corrugate fiberboard during the past 15 years, from 100 ft./min. to speeds in excess of 300 ft./min. and of 400 ft./min. in occasional instances, have been achieved using silicate adhesives. Silicate solutions are especially suited to such high speeds because of the mechanism by which they set to form an adhesive bond, i.e., by the loss of a small amount of water. It is not necessary to raise the adhesive above any critical temperature, and this factor more than any other gives the silicate adhesive the operating flexibility necessary for these high speeds. This characteristic of silicate adhesives is emphasized by speeds possible in fabrication of board with heavy liners and in production of double-double board. In these cases, the poor heat conductance of the paperboard makes it impossible to attain a very high temperature at the glue line, but use of silicate adhesives permits operation at economical speeds.

Many of the factors determining the rate at which silicate adhesives may be used have been previously discussed. It is essentially a matter of choosing the commercial grade of silicate, conditioning the paper, and adjusting the machine in order that water may be extracted from the silicate within the required length of time. The mechanical condition of the equipment is especially important. Selection of and control of the amount of the silicate adhesive used will compensate to a certain extent for mechanical imperfections, but will not obviate them entirely.

In any consideration of production rate, the most important item is not the maximum speed obtained but the average speed. The average production rate will depend not only upon the maximum speed at which the equipment can be operated with production of satisfactory board, but also upon steady operation. The influence of silicate adhesives is important in this latter respect because of their uniformity, of their stability in storage, of the ease with which they may be delivered to the corrugating machines, of their relative insensitiveness to the temperatures encountered in the adhesive pans, and especially because of the variable operating conditions under which they can be used with assurance of a satisfactory adhesive bond.

Waste

An important factor in efficient operation of a boxboard plant is the production of a minimum amount of waste. This is important because the cost of the paperboard going into the operation constitutes a high proportion of the cost of the finished corrugated board. In evaluating the operating characteristics of silicate adhesives, it is important to determine what effects, if any, they have on the amount of waste produced.

Some waste on account of side trim is necessary and the percentage of this type of waste depends upon the judgment of the planning department, the size of the paper rolls in stock and orders received. Another source of waste is roll wraps and roll stubs. Obviously these types of waste are in no way connected with the corrugating adhesive. The only other source is that of "broke" coming from the end of the machine. It is possible that the characteristics of the

adhesive used might have some influence on this type of waste.

In order to investigate this point, observations on waste productions have been made in a number of commercial plants. In one typical plant, the amount of waste was determined for one corrugating machine for each of 30 shifts, and on another machine of comparable size and mechanical conditions for each of 45 shifts. It was found that the percentage of waste varied with the shift crew. The waste percentage of total production, excluding side trim, for the three crews on one machine being 2.6, 3.7, and 3.7 per cent, and the corresponding values for the three crews on the other machine being 4.2, 4.8, and 6.7 per cent. It was noted that the amount of waste produced by any crew was in direct relation to its experience and ability. This would suggest that a major portion, at least, of the waste produced is traceable to the mechanical operation of the corrugating machine.

The matter was explored further by analyzing the cause of the waste produced on a number of shifts. The results of this analysis are given in Table II.

TABLE II.—ANALYSIS OF TYPICAL WASTE

Cause of waste	Waste lb.	Waste on basis of total Production %
A. Outside layers and ends of rolls not passing over machine	4,480	1.40
B. Uncombined board passing over machine with change of rolls and break in paper	2,350	0.81
C. Operations not involving adhesive:—		
Out of line	1,450	
Long or short sheets	690	
Moving trimmers	400	
Worn belt on double-facer	210	
Paper burned with machine down	160	
Straw torn in corrugating	120	
Liners wrinkled	40	
Wrong size liner	30	
	3,100	1.06
D. Operations involving adhesive:—		
1. Not involving characteristics of silicate:—		
Inadequate adhesive	310	
Dry adhesive pans	110	
Dry adhesive from stopping machine	40	
Wet straw	30	
	490	0.17
2. Possibly involving characteristics of silicate:—		
Blisters on single face (dirty corrugating rolls)	520	
Fingers too close to edge of sheet	90	
Miscellaneous	120	
	730	0.25
Total waste		3.7

These data, which have been confirmed by other similar examinations, indicate that only a minor portion of the total waste production could possibly be attributed to the silicate. It would seem that the value 0.25 per cent given in the above table represents a fair average, although for any given short period of time appreciably higher or lower values might be observed. The reason for the low amount of waste produced with silicate adhesives is traceable to the wide variation of conditions under which a silicate adhesive bond may be formed. If, as happens in any manufacturing operation, it is not always possible for one reason or another to maintain optimum operating conditions, the flexibility of performance inherent in silicate adhesives allows the production of board rather than waste, although the board will not be of highest quality.

Board Properties

Another phase of the operating performance of silicate adhesives is reflected in the properties of the corrugated fiberboard coming from the fabricating machine. The characteristics of the freshly combined board determine the manner in which it is necessary to handle it through the printing, scoring, slotting, and taping operations. Influence of the adhesive in this connection is quite marked.

Warping of corrugated board frequently occurs as it leaves the double-facing unit. This interferes seriously with the passing of the board through the box forming operations and, if it occurs to sufficient extent, may prevent conversion of the board into boxes. In the majority of cases, this warping is caused by a lack of balance in the moisture content of the individual components of the board, resulting in uneven contraction upon seasoning and drying. Warping will result from using on one face of the board a liner having a moisture content appreciably different from that of the liner on the other face. The same effect is produced if one liner picks up more moisture than the other liner during the combining operation. It follows that warping can be corrected by controlling the moisture content of the board. Warping which is concave toward the single-face side is caused by either excessive moisture in the single-face liner or an insufficient amount in the double-face liner. This may be corrected by (1) decreasing the amount of adhesive on the single-face or increasing the amount on the double-face side, (2) decreasing the water content of the single-face adhesive or increasing that of the double-face adhesive, (3) reducing moisture content of the single-face board before it passes to the double-facing unit by the methods previously suggested, (4) steaming the double-face liner, (5) use of less preheating on the double-face liner. In the case where the warping is convex toward the single-face side, the cause is the opposite of that in the previous case and may be corrected by employing the reverse of the procedures suggested above. Silicate adhesives introduce only a small amount of moisture into the paper in the combining operation because of the small water loss necessary to set the adhesive bond. Obviously the smaller the amount of moisture introduced into the board during bond formation the easier it will be to preserve the desired balance. In fact it is usually necessary that water be introduced from other sources before it is possible to produce warped board with silicate adhesives.

The small amount of water introduced into the board silicate adhesives is evident in the stiffness and hardness of the board as it leaves the machine. This board may be handled and stacked without danger of bending and breaking which would occur if a large amount of water had been introduced with the adhesive. The freshly combined board may be stacked without crushing the flutes and consequent reduction in strength characteristics of the board structure. Board glued with the usual silicate adhesives can be taken directly from the corrugating machine to the other boxmaking operations. At this point, it will have sufficient strength to withstand the pressures normally encountered in printing and in taping. The strength of the adhesive bond is also sufficient to withstand stresses put upon it by the scoring and slotting operations. This point is of considerable im-

FIG. 12.
Box Completed and Bearing Load Six Minutes after First Step in Forming Corrugated Paper from Flat Sheets with Silicate Adhesives.

portance to corrugating plants which do not have sufficient space for storage during an extended seasoning period or for the production of rush orders. Cases have been noted in which silicate glued board was taken directly from the corrugator and passed to the printer-slotter while still hot enough to cause severe physical discomfort when handled with bare hands, the green strength of the adhesive bond being sufficient that the quality of boxes constructed from board subjected to this rigorous treatment was not adversely affected. In another case, the various individual components were converted into corrugated board and the board fabricated into complete boxes within 6 minutes. (Fig. 12). On the other hand, board may be stored for long periods and, providing its moisture content is within usual limits, converted into boxes without difficulty.

In order to secure a corrugated container of pleasing appearance and one which can be satisfactorily printed, it is necessary that the exterior or double-face surface be perfectly smooth. If an excessive amount of water is introduced into this liner, either through the adhesive or by other means, there will be a sagging of the liner between the tips of the flutes with the lighter grades of linerboard. If this is sufficiently severe, the adhesive bonds will be broken in places producing small blisters. Silicate adhesives of the proper grade used in proper amounts do not in themselves introduce sufficient water into the linerboard to permit such sagging between the flutes, or washboarding effect.

The operating performance of silicate adhesives follows naturally from the fundamental properties of sodium silicate solutions. With due attention to the conditions imposed by these properties, a maximum of efficiency in operation and of product quality is attained. By virtue of the properties of sodium silicate solutions, it is possible to depart rather widely from the indicated optimum operating conditions without excessive sacrifice in operating efficiency or in quality of the corrugated board produced. A more complete consideration of the quality and strength characteristics of silicate glued board is presented in a separate paper.

Acknowledgment

The authors take this opportunity to express their appreciation to the large number of corrugating plants which have cooperated in studying and improving the operating characteristics of sodium silicate adhesives.

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Dow Chemical Company Joins TAPPI

The Dow Chemical Company of Midland, Mich. has become a member of the Technical Association of the Pulp and Paper Industry. The company was founded in 1889 when the chemical industry in this country was still in its infancy and most chemicals were being imported from abroad.

The company's initial contribution to the advancement of domestic chemical manufacture was bromine, extracted from brine by a new and original process. The low cost production of bromine and bromides at Midland was the first serious American challenge to the European chemical industry and has since become a world factor.

Following closely on the heels of this development was the adaption of the bromine process to the manufacture of chlorine, thus opening up the important field of chlorinated products. Although the Company is now one of the largest producers of chlorine in the country, its entire output is being consumed in its own manufacturing operations.

The process of making chlorine also produced caustic soda as a co-product. This led to the development of new processes utilizing chlorine and caustic soda in the manufacture of anilin, phenol, indigo and other organic compounds.

Advances in the plastics industry soon after the war created an increased demand for phenol. To meet this demand, the Company perfected an entirely new process and in 1922, erected and placed in operation the largest synthetic phenol plant in the world. The production of ethyl cellulose, styrene and polystyrene mark new stages of Dow technological achievement. These important thermoplastics form the basis of molding plastics, transparent films, and coating compositions.

The Midland, Mich. plant of the Dow Chemical Company manufactures the following products which go into the paper industry: Epsom salt and preservatives, Dowicides, ethocell, methocell, caustic soda and sodium sulphide. The Great Western Division, located at Pittsburg, Cal. makes chlorine, sulphur dioxide and zinc hydrosulphite for paper mills.

TAPPI to See House of Magic

The next meeting of the Empire State Section of the Technical Association of the Pulp and Paper Industry will be held at the Van Curler Hotel, Schenectady, N. Y. on April 5-6, 1940. The meeting will begin at 10:30 A.M. Friday, April 5 in Rice Hall of the General Electric Company where the wonders of the House of Magic, made famous at the New York World's Fair, will be displayed. This will be followed by luncheon as guests of G. E. and a visit through the plant. In the evening there will be a dinner and dance and on Saturday morning three technical papers will be presented. M. J. Maguire of the Hercules Powder Company attended the recent meeting of the New England Section at Holyoke and extended the Empire State Section's cordial invitation to New England Tappimen to attend the Schenectady meeting.

Imports of Paper and Paper Making Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING MARCH 16, 1940

SUMMARY

Kraft paper .....220 bls., 1,382 rolls
Wrapping paper .....86 cs.
Filter paper .....6 cs.
Surface baryta coated paper .....17 cs.
Surface coated paper .....126 cs.
Marble paper .....1 cs.
Boards .....72 bls.
Miscellaneous paper .....4 bls., 138 rolls

KRAFT PAPER

Walker Goulard Plehn Co., ———, Gothenburg, 220 bls., 1,382 rolls.

WRAPPING PAPER

———, *Visgnes,* Antwerp, 86 cs.

FILTER PAPER

E. H. Sargent & Co., ———, Gothenburg, 6 cs.

SURFACE BARYTA COATED PAPER

P. Puttmann, *Westernland,* Antwerp, 17 cs.

SURFACE COATED PAPER

P. Puttmann, *Westernland,* Antwerp, 56 cs.
Gevaert Co., of America, *Westernland,* Antwerp. 14 cs., (unfinished photo-paper).
Gevaert Co., of America, *Visgnes,* Antwerp, 56 cs., (unfinished photo-paper).

MARBLE PAPER

Tamm & Co., *Visgnes,* Antwerp, 1 cs.

BOARDS

Miller Paper Co., ———, Gothenburg, 72 bls.

MISCELLANEOUS PAPER

Blauvelt Wiley Paper Manfg. Co., ———, Gothenburg, 24 rolls.
W. I. Chudleigh, ———, Gothenburg, 4 bls.
F. L. Kramer & Co., ———, Gothenburg, 62 rolls.
The Borregaard Co., Inc., ———, Gothenburg, 52 rolls.

BAGS, BAGGINGS, ETC.

W. Steck & Co., *Visgnes,* Antwerp, 366 bls. flax waste.
———, *Oriente,* Havana, 64 bls. rags.
J. Levy & Son, *Monterey,* Havana, 11 bls., 6 bags rags.

WOOD PULP

Gottesman & Co., Inc., ———, Gothenburg, 384 bls. wood pulp, 108 bls. dry wood pulp.
Gottesman & Co., Inc., ———, Gothenburg, 3,331 bls. kraft pulp.
Cellulose Sales Co., Inc., ———, Gothenburg, 1,501 bls. sulphate.
Perkins Goodwin & Co., ———, Gothenburg, 300 bls. kraft pulp.
Bulkley Dunton Pulp Co., Inc., ———, Gothenburg, 2,000 bls. dry sulphite.
D. M. Hicks, Inc., *Westernland,* Antwerp, 194 bls. wood pulp.
E. M. Sergeant Pulp & Chemical Co., *Tyrifjord,* Nygard, 250 bls. dry sulphite, 50 tons.

LOS ANGELES IMPORTS

WEEK ENDING MARCH 16, 1940

———, *Margaret Johnson,* Norrkoping, 558 rolls newsprint.
———, *Margaret Johnson,* Falun, 182 bls. newsprint.
———, *Kingsley,* Powell River, 575 pkgs. newsprint.

G. M. Rudy Heads Norwood

FLORENCE, Mass., March 18, 1940—George M. Rudy, has been named vice-president and general manager of the Norwood Engineering company to succeed Howard W. Hosford, who retired last year as general manager of the concern. Previously Mr. Rudy was vice-president of the Norwood company and general manager of the paper mill equipment division.

Mr. Rudy, who was born in Lancaster, Pa. graduated from Lancaster high school in 1900 and Lancaster Business college in 1903. While serving his apprenticeship as a machinist, he completed evening courses in drafting, special mathematics, mechanical engineering and English.

Associated with the Norwood Engineering company since 1904 Mr. Rudy served until 1926 as foreman and gained experience as an inside and outside erector and special machinist. He was promoted to the post of sales engineer and manager of the paper machinery division and in 1930 was made superintendent and assistant general manager.

Mr. Rudy became vice president of the Norwood company and general manager of the paper mill equipment division in March, 1939.

During the time that he has been associated with the engineering business, Mr. Rudy has won considerable recognition for inventions and developments in paper finishing machinery.

H. S. Bates Leaves Hurlbut Paper Co.

Harold S. Bates, treasurer of the Hurlbut Paper Company, South Lee, Mass., has resigned his position effective as of April 1. Mr. Bates leaves soon to assume an executive position with *The Free Press* of Burlington, Vt.

Mr. Bates has been with the Hurlbut Paper Company since 1930, coming to the mill after graduation from the University of Pennsylvania, where he took the course at the Wharton School of Finance and Commerce.

Pulpwood Consumption Doubles

Consumption of pulpwood in the South just about doubled in the eight years from 1929 to 1936, according to the U. S. Forest Service.

It rose from about one and one-fourth million cords in '29 to nearly two and one-half million cords in 1936, when Southern consumption was 28.3 per cent of the nation's total, compared with 16.5 per cent in '29.

Since 1939 Southern wood pulp and paper production has made a further big gain.

Pulp and Roll Handling at Southland

The original plans of Southland Paper Mills Inc., involved the unloading and storage of 1500 tons of sulphate pulp in bales in seven-day schedules. From this storage 30 tons would be used daily. Each bale of pulp measures 32 inches square by 16 inches high and weighs 450 pounds.

Based on this requirement, Automatic Transportation Company furnished a suitable paper handling truck as illustrated by Fig. 1. This is a 4000 pound capacity 72,000 inch lb. rated center control telescopic tilting tiering fork truck. To facilitate efficient pick up, transportation and storage ot bales, chisel type forks were provided 32 inches long having removable back extensions 80 inches high so that 5 bundles of pulp can be picked up and transported at one time.

This truck was equipped with a telescopic lift of 123 inches and has a collapsed height of 88 inches so that 10 bundles of pulp can be stacked vertically in storage in two unit loads.

The other problem of handling the newsprint rolls required suitable equipment to pick up same from machines and transport to storage and then from storage to box-cars. These to be handled in either vertical or horizontal position.

This involved handling various size rolls 36 inches to 42 inches diameter ranging from 16 to 72 inches wide and weighing from 1500 to 2100 pounds. Also at times 100 inch wide rolls are required to be handled. To meet this requirement an "Automatic" 4000 lb. capacity roll handler was furnished equipped with a motorized revolving scoop or roll cradle as illustrated by Fig. 2.

This cradle or scoop is arranged to handle the minimum and maximum size rolls outlined above and has a telescopic lift of 123 inches, so that rolls can be placed in a horizontal position three or four high or vertical position, depending on the diameter and width of rolls.

Each "Automatic" truck is of the latest design, with center control for clear operating vision and is equipped with the latest safety features and mechanical improvements, so that the trucks can be operated with maximum efficiency and dependability. These are also compactly built for easy maneuvering and operation in minimum space. Each truck is powered by Exide Ironclad battery 15 cells 19 TLM type,

Fig. 1.

Fig. 2.

450 ampere hour capacity. Four batteries were originally furnished, so that the trucks could be operated in three 8-hour shifts to meet production requirements.

Ohio TAPPI Discusses Pulp Cleaning

The Ohio Section of the Technical Association of the Pulp and Paper Industry met at the Hotel Manchester, Middletown, Ohio, on Saturday, March 16, 1940. John Burdsall of the Crystal Tissue Company presided as chairman.

H. H. Harrison, member of the national executive committee, gave a brief report of the annual meeting of the Association, held in New York in February.

The principal speaker was Douglas Robbins of Middletown, Ohio, representing the Nichols Engineering and Research Corporation of New York who discussed the development and use of the Vortrap in the paper industry for removing dirt from pulp and paper suspensions. An interesting discussion followed the presentation.

The next meeting will be held jointly with the Miami Valley Superintendents Division and will be featured by a visit to the Orr Felt and Blanket Company at Piqua, Ohio.

Those present included G. H. Harvey, H. F. Burnett, H. C. Fisher, D. S. Brown, W. H. Boost, Harry Ladley, Thage Dahlgren, C. R. Merriman, J. Ditmyer, G. H. Luhs, R. G. H. Smith, L. C. Currier, R. B. Roe, C. A. Sorg, Andrew Fraser, Edward Lum, Wm. Reigers, H. C. Leighton, John Burnett, J. C. Lowe, P. J. Jerade, H. H. Harrison, John Burdsall, Sven Sandelius, R. E. Bard, T. M. Chemerys, J. H. Tate, Lloyd Bovier, C. D. Roess, A. L. Hawk, R. M. Bond, K. P. Geohegan, Douglas Robbins, G. B. Hughey, D. S. Gilmore, E. C. Hendrickson, E. B. Jaurin, Edgar Turnbull, Myron Wittmer, H. Waffenschmitt, R. L. Eminger and R. S. Raker.

Paper Festival Opens April 1

The Southern Paper Festival in honor of the paper and pulp industry in the South opens April 1 at Savannah, Ga. The festival will feature the educational value and present useful information of paper and paper products, timber and forestry, during the week of the event. A Mardi Gras spirit will prevail and the great mummers parade, street dances and pageants will contribute color and entertainment for the large number of visitors expected this year.

The Nekoosa Portable Wood Peeler offers These Advantages Over Hand Peeling

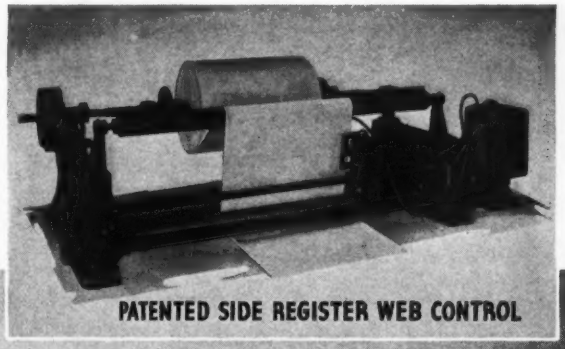
Peeling 100 inch Balsam at the rate of seven cords per hour.

1. *Reduces Costs*
2. *Lengthens Peeling season*
3. *Eliminates Fire Hazard*

Nekoosa Foundry & Machine Works, Inc.

NEKOOSA, WIS., U. S. A.

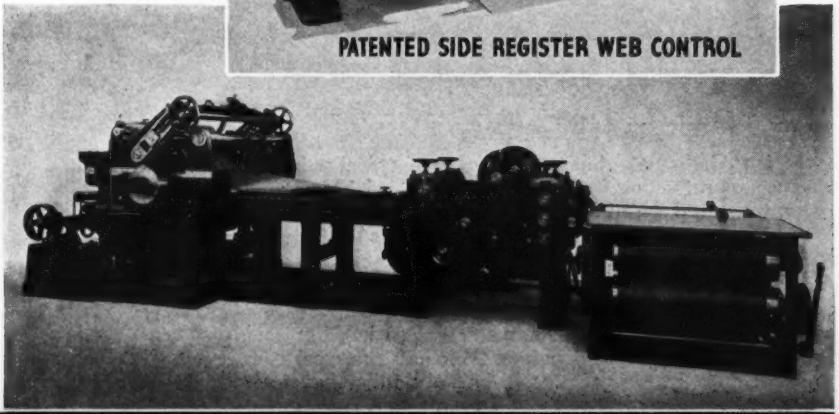
Where rolls of paper are unevenly wound, this SIDE REGISTER, by means of the electric eye feeds the web edge in a straight line to the machine.



PATENTED SIDE REGISTER WEB CONTROL

Paper Bag Machinery

A compact machine for paper bag tubes, with thumb lip compensator, side delivery, and SIDE REGISTER control for duplex or single wall paper bag tubes—All rotary.



The SMITH & WINCHESTER Manufacturing Company

SOUTH WINDHAM CONNECTICUT

New York Paper and Pulp Market Review

Wholesale Paper Sales Continue Above Current Week of Last Year As General Business Activity Is About 10 Per Cent Higher Than In 1939—All Pulp Prices Firm—Roofing Rags Lower—Paper Stock Prices Steady.

Office of the PAPER TRADE JOURNAL.
Wednesday, March 20, 1940.

Sales in the wholesale paper market continue about on the level of last week and above that of the same period last year, according to reports received from many manufacturers' representatives, jobbers and general paper merchants.

Business activity for February, as indicated by check payments, was 11.14 per cent higher than last year. Increased activity was reported in all states, 15 of which reported trade above the national average, 16 equal to it and 17 states, including New York, below the national average.

The index of general business activity declined to 96.0 per cent for the week ended March 9, from 96.8 per cent for the preceding week, compared with 89.5 per cent for the corresponding week last year.

Paper production for the week ended March 9 was estimated at 79.9 per cent, compared with 83.1 per cent for 1939, with 70.1 per cent for 1938, with 90.6 per cent for 1937, and with 78.5 per cent for the corresponding week in 1936.

Paper board production for the week ended March 9 was 69.0 per cent, compared with 70.0 per cent for 1939, with 61.0 per cent for 1938, with 84.0 per cent for 1937 and with 67.0 per cent for the like week in 1936.

The newsprint market reports little change for the week. Domestic production for February was 81,455 tons. Total production for February was 231,823 tons, compared with 293,628 tons for February 1939. Domestic mill stocks at the end of February totaled 17,602 tons; Canadian mill stocks, 196,762 tons. The combined total was 214,364 tons, compared with 192,380 tons at the end of January.

Sales in many lines of paper is being maintained at a relatively good level in comparison with the current week last year and above that level. Signs of an improvement in consumer demand are reported in some quarters of the trade on a number of grades of paper. No change in representative quoted market prices has been reported to date.

Mechanical Pulp

Reports indicate a rising output of mechanical pulp. Domestic production for January 1940 totaled 102,352 tons, compared with 96,942 tons for December, 1939. Stocks on hand at the end of January totaled 20,308 tons; imports amounted to 19,199 tons.

Chemical Pulp

No import change in demand or prices has been reported in the chemical pulp market for the week. Domestic production of bleached sulphite for January 1940 totaled 129,283 tons; imports 48,887 tons; exports, 14,351 tons. Domestic output of unbleached sulphite was 72,057 tons; imports 91,392 tons; exports 3,663 tons. Domestic production of soda pulp was 43,843 tons; imports 1,330 tons; exports, 330 tons.

Domestic production of unbleached sulphate for January 1940 was 241,367 tons; imports 79,358 tons; exports 870 tons. Production of bleached sulphate was 41,158 tons; imports 22,205 tons; exports 162 tons.

Rags

Trading in a few grades of rags is reported a little more active this week. No price changes have been reported on any grade of new rags. Roofing rags have declined this week and the No. 1 grade is currently quoted at from 1.15 to 1.25 and the No. 2 grade at from .95 to 1.00.

Old Rope and Bagging

Old rope prices contiue firm under reports of limited supplies of old Manila rope. No important change in prices or demand has been reported during the current week.

The old bagging market is reported as rather soft this week with prices unchanged.

Old Waste Paper

Most quotations hold unchanged and are steady in all but two grades of paper stock this week. Lower prices are currently quoted on white ledger stock, at from 1.60 to 1.70, and old kraft machine compressed bales at from 1.05 to 1.15.

Twine

Prices continue unchanged on hard and soft fiber twines, with demand reported at a little higher level than at this period last year. More activity in this market is looked for in the trade next month.

Philadelphia Business Improves

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., March 18, 1940—With a much improved inquiry and steadily reviving demand for paper, the Philadelphia industry is enjoying a leisurely pace despite the fact that Easter this year is the earliest date in a quarter-century and the swirl of Easter shopping has already contributed the much needed stimulus which has been lacking in this area since the turn of the year. In both fine and wrapping paper divisions the industry appears to be making headway.

With the rising demand paper dealers look for higher prices in the very near future believing that paper distribution will in its broadening scale permit of adjustment of values according to the law of supply and demand.

Waterfalls Mills Opens Boston Office

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 18, 1940—The Waterfalls Paper Mills, Mechanic Falls, Me., has opened an office in the Public Service Building, fifth floor, in charge of Norman Rhoades.

NELIO PURE GUM ROSIN *and* Rosin Size

Two thoroughly dependable gum rosin products made by modern scientific methods and free from the faults of ordinary gum rosin.

Investigate NELIO. In addition to its outstanding qualities of performance, its superior virtues offer economies in handling.

NELIO IS UNIFORM—Standard grades never varying in color and quality from drum to drum or shipment to shipment.

NELIO IS BRILLIANT—Assuring lighter grades of paper.

NELIO IS DRY—The turpentine content is extremely low.

NELIO IS CLEAN—Absolutely free of dirt and foreign matter. Manufactured in stainless steel equipment.

NELIO IS FULL WEIGHT—Shipped in standard, non-absorbent leak-proof metal drums, in 100-lb. net weight paper bags or in fluid state in insulated tank cars. Nelio Rosin size is shipped in liquid state in drums or tank cars.

NELIO TECHNICAL SERVICE—Consulting service by experienced paper technicians is available to paper mills on request.

Write for samples and prices.

Manufactured by

THE GLIDDEN COMPANY

Nelio-Resin Division

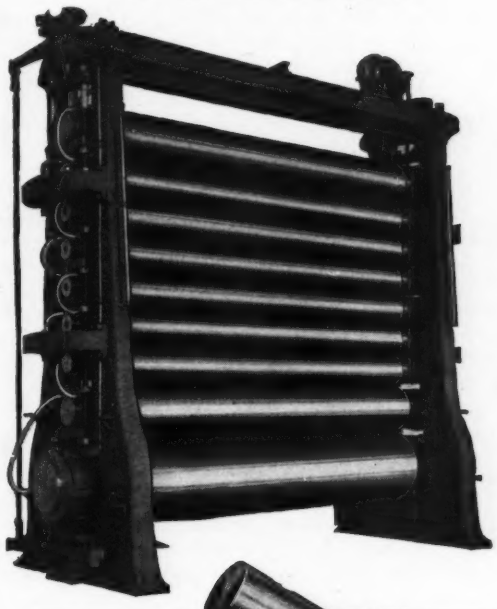
JACKSONVILLE FLORIDA

Sold by

E. W. COLLEDGE General Sales Ag't. Inc.

CHICAGO
310 South Michigan Ave.
NEW YORK
300 Madison Avenue
CLEVELAND
616 Guardian Bldg.
SAN FRANCISCO
503 Market Street

LOBDELL CALENDER STACKS



With Lobdell "PURALOY" Chilled Calender Rolls

They assure maximum hardness and a perfect surface . . . they minimize pitting and wear. Ideal for the very severe conditions of water finish papers.

"Puraloy" rolls . . . floor controlled lifting device . . . "point-by-point" lubrication . . . choice of electric motor, hydraulic or ratchet lift . . . they're some of the features that have made more than 300 paper mills say "Lobdell" for calendering.

You'll say the same once you've investigated. Ask for complete data—no obligation. Just write—

LOBDELL
CAR WHEEL COMPANY
104 Years in Business
WILMINGTON·DELAWARE

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, March 20, 1940.

BLANC FIXE—Prices on blanc fixe are firm and conform to prevailing market quotations. The pulp is currently quoted at $35 per ton, in barrels, at works. The powder is quoted at $50 per ton, in bags, f.o.b., works.

BLEACHING POWDER—Quotations on bleaching powder are firm and unchanged at prevailing market prices. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are unchanged for the week. Standard domestic casein, 20-30 mesh, is currently quoted at from 10½ to 11 cents per pound; 80-100 mesh, at from 11 to 11½ cents per pound. All prices in bags, car lots. Standard Argentina casein is currently quoted at from 10½ to 11 cents per pound; French casein is offered at from 14½ to 15 cents per pound.

CAUSTIC SODA—Quotations on caustic soda are firm and unchanged with trading reported as moderately good. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay are firm and continue unchanged. Domestic filler clay is currently quoted at from $7 to $15 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—The demand for chlorine is reported as moderate with prices firm and unchanged and conforming to prevailing market prices. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm and prices unchanged at prevailing market levels. "G" gum rosin is currently quoted at $5.50 per 280 pounds, gross weight, in barrels, Savannah. "FF" wood rosin is offered at $5.45 per 280 pounds, gross weight, in barrels, New York. Seventy per cent gum rosin size is quoted at $2.90 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Quotations on salt cake are firm under a good demand and current quotations continue practically nominal. Domestic salt cake is currently quoted at $17 per ton, in bulk; chrome salt cake at $16 per ton; all prices in car lots, f.o.b., shipping point. The quotation of $20 per ton on imported salk cake is nominal.

SODA ASH—Prices on soda ash are firm and continue to conform to prevailing market levels. Demand continues moderately good. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Quotations on corn starch continue unchanged at prevailing market levels. Pearl is currently quoted at $2.60 per 100 pounds; powdered starch at $2.70 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Prices on sulphate of alumina are firm under a steady demand. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at $1.45 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Quotations on sulphur are unchanged and conform to prevailing market prices. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are offered at $19 per ton.

TALC—Prices on talc are firm and continue unchanged at prevailing market levels. Domestic talc is currently quoted at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $23 to $45 per ton.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.00	@	$5.50
Superstandard	4.62½	"	5.00
Northern Standard Wrapping	4.25	"	4.62½
Standard Wrapping	4.00	"	—
Tissues—Per Ream—Carlots			
White No. 1	.92½	@	—
White No. 1 M. G.	.90	"	—
White No. 1½	.70	"	—
White No. 2	.65	"	—
Anti-Tarnish M. G.	.80	"	—
Colored	.87½	"	—
Kraft	.80	"	—
Manila	.65	"	—
Unbl. Toilet, 1 M.	3.50	"	—
Bleached Toilet	5.26	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	1.95	@	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	8.25	@	10.25
No. 1 Manila Wrapping, 35 lb.	5.25	"	—
No. 2 Manila Wrapping, 35 lb.	5.00	"	—
Boards, per ton—			
News	35.00	@	40.00
Chip	35.00	"	40.00
Sgl. Mla. Lt. Chip	55.00	"	—
White Pat. Coated	67.50	"	—
Kraft Liners	55.00	"	—
Binders Boards	76.00	"	87.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds		Ledgers
100% Rag Ext. No. 1	$39.10 @ $46.00		$40.25 @ $47.25
100% Rag	31.05 " 36.50		32.20 " 37.75
85% Rag	.... "		29.90 " 35.00
75% Rag	23.60 " 27.75		24.75 " 29.00
65% Rag	.... "		21.65 " 26.25
50% Rag	17.55 " 21.50		18.70 " 22.75
25% Rag	14.65 " 17.75		15.80 " 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds		Ledgers
No. 1	$8.95 @ $11.00		$10.10 @ $12.25
No. 2	8.05 " 9.75		9.25 " 11.25
No. 3	7.60 " 9.25		8.50 " 10.75
No. 4	7.30 " 9.00		8.50 " 10.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,

Delivered in Zone 1:

No. 1 Glossy Coated	$11.90	@	$13.50
No. 2 Glossy Coated	10.35	"	11.75
No. 3 Glossy Coated	9.55	"	11.00
No. 4 Glossy Coated	9.15	"	10.50
No. 1 Antique (watermarked)	8.35	"	9.50
No. 2 Offset	7.70	"	9.00
A Grade E. F.	7.50	"	8.75
A Grade S. & S. C.	7.75	"	9.00
B Grade E. F.	6.95	"	8.00
B Grade S. & S. C.	7.20	"	8.25
C Grade E. F.	6.65	"	7.75
C Grade S. & S. C.	6.90	"	8.00
D Grade E. F.	6.40	"	7.50
D Grade S. & S. C.	6.65	"	7.75

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	$38.00	@	44.00
Dry	38.00	"	44.00

(Delivered)

No. 1 Domestic and Canadian	40.00	@	42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.00	@	3.40
Prime Qualities—			
Easy-Bleaching Sulphite	2.75	"	2.95
Strong Unbleached Sulphite	2.75	"	2.85

(On Dock, Atlantic Ports)

Kraft Bleached	3.37½	@	3.50
Kraft Light & Strong	2.50	"	2.75
Kraft No. 1	2.40	"	2.65

(F. o. b. Pulp Mill)

Kraft Domestic and Canadian	2.00	"	2.37½

(Delivered)

Soda Bleached	2.90	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	7.50	@	7.75
Silesias No. 1	4.50	"	4.75
New Unbleached	7.50	"	7.75
Blue Overall	5.00	"	5.25
Fancy	2.25	"	2.50
Washables	2.00	"	2.15
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.25	"	3.50

Old Rags

White, No. 1—			
Repacked	3.25	"	3.50
Miscellaneous	2.75	"	3.00
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	2.00	"	2.25
Miscellaneous	1.75	"	1.90
Roofing Rags—			
No. 1	1.15	"	1.25
No. 2	.95	"	1.00
No. 3 (bagging)	1.50	"	1.60
No. 4	.60	"	.65
No. 5A	.60	"	.65

Foreign Rags

All prices nominal.

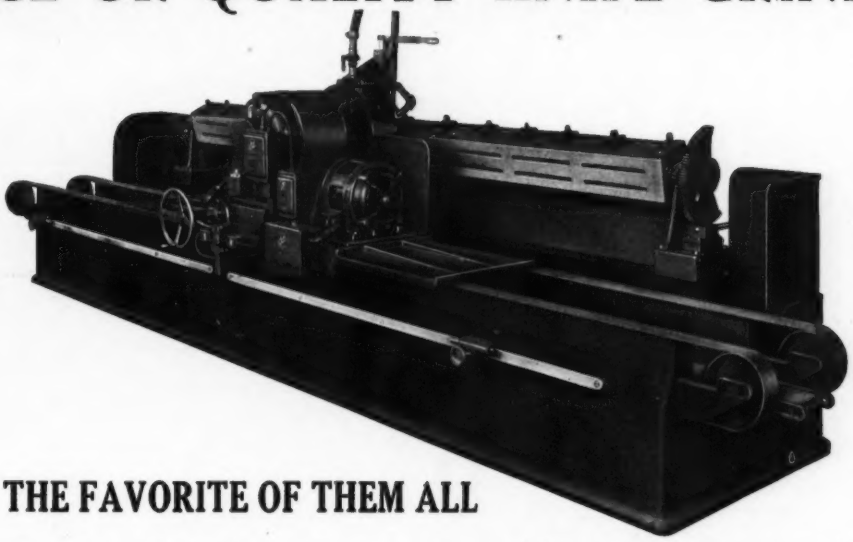
New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxford	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

PRICE OR QUALITY KNIFE GRINDER



THE FAVORITE OF THEM ALL

Sometimes when it is a question of price or quality, there may be some doubt as to which is the more economical investment. Though for any extended service the element of quality (on a machine which will last for many years) has it so far over the question of initial cost that there is not much room for question.

And with the latest Covel-Hanchett grinder (the machine which established the traveling wheel grinder market,—the product of many years development of this one special service) where both low price and high quality prevail—that is what makes the Covel-Hanchett Traveling Wheel Grinder the machine employed in more paper mills than all other models combined.

For catalogue description write to the pioneers in the industry. No obligation.

COVEL-HANCHETT CO.

Big Rapids, Mich., U. S. A.

HIGHEST QUALITY CLAYS

LUMP and POWDERED } IMPORTED — DOMESTIC { CRUDE CRUSHED, AIR FLOATED, WATER WASHED

PAPER MAKERS IMPORTING CO. INC. BOSTON, PENNSYLVANIA, U.S.A.

PRECIPITATED CALCIUM CARBONATE

THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, NEW YORK
MACHINISTS & FOUNDERS
Specializing in Reliable Sandy Hill Pulp and Paper Mill Machinery
Also Builders of Bertrams and Kamyr Equipment

INDUSTRIAL TYCOL OILS-GREASES

A COMPLETE LINE
OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE
Tide Water Associated Oil Co.
Tide Water Division
17 Battery Place, New York, N.Y.

Outlast Others 2 to 15 Times...

MONEL 2/3 NICKEL + 1/3 COPPER

MONEL WIRE CLOTH COVERS
on Washers, Thickeners, Machine Cylinders, Save-Alls, Wet Machines, Black Liquor and Lime Mud Filters.

Last longer, cost less... as proved in more than 25 years of service.

ASK YOUR WEAVER FOR MONEL CLOTH

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street **New York, N.Y.**

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens..	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.75	@	3.00
Domestic	2.50	"	2.75
Wool Tares, light...	2.00	"	2.25
Wool Tares, heavy..	2.12½	"	2.25
Bright Bagging.....	2.25	"	2.50
Manila Rope—			
Foreign	5.00	"	5.75
Domestic	4.75	"	5.00
Jute Threads.....	3.00	"	3.25
Sisal Strings.....	2.00	"	2.25
Mixed Strings.....	.70	"	.85

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.25	@	2.50
Soft White No. 1..	1.80	"	1.90
Soft White Extra..	2.50	"	2.60
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag....	1.00	"	1.10
Solid Flat Book....	.75	"	.85
Crumbled No. 1...	.70	"	.75
Ledger White Stock.	1.60	"	1.70
Ledger Stock Colored	1.05	"	1.15
Manila—			
New Env. Cut....	1.70	"	1.80
New Cuttings.....	1.30	"	1.40
Old Kraft Machine—			
Compressed bales..	1.05	"	1.15
News—			
No. 1 White News	1.75	"	1.90
Strictly Overissue.	.70	"	.75
Strictly Folded....	.40	"	.45
Corrugated	.40	"	.45
No. 1 Mixed Paper..	.22	"	.25

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.18½	@	—
White Hemp.....	.18½	"	—
Fine Polished—			
Fine India.....	.23	"	—
Unpolished—			
Box	.14¾	"	—
Paper Makers.....	.15	"	—
Tube Rope.....	.16¼	"	—
Wall Paper.....	.15¾	"	—
Wrapping	.18	"	—
Soft Fiber Rope...	.16¼	"	—
Cotton	.21	"	—

(Hard Fiber)

Medium Java.....	.19	"	—
Mex. Sisal.....	.16	"	—
Manila	.24	"	—
Domestic	—	"	2.50
Sisal Rope.....	2.25	"	2.65
Mixed Rope.....	.85	"	1.00
Transmission Rope..	3.00	"	3.50
Foreign	3.50	@	—
Soft Jute Ropes.....	3.00	"	3.50
Jute Carpet Threads.	1.50	"	1.75
Gunny Bagging—			
Foreign	2.85	"	—
Domestic	2.50	"	2.60
Bleachery Burlap....	3.50	"	3.75
Scrap Burlap—			
Foreign	2.60	"	—
Domestic	2.50	"	—
Scrap Sisal.....	2.50	"	2.60
Scrap Sisal for Shredding	2.30	"	2.65
Wool Tares, Heavy..	2.50	"	2.60
New Burlap Cuttings	3.25	"	3.50
Aust. Wool Pouches.	2.90	"	3.00
Heavy baling bagging	2.60	"	2.90
Paper Mill Bagging..	1.75	"	2.00
No. 2 Bagging	1.10	"	1.25

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.04	"	.04¼
New White No. 1.	—	"	.07½
New Light Flannelettes	.05	"	.05¾
Silesias No. 1	.05	"	—
New Black Silesias..	.03½	"	.03¾
Soft Unbleached...	.07	"	.07½
Blue Cheviots.....	.05	"	.05½
Fancy	.02	"	.02½
Washable	.02	"	.02½
Cottons—According to Gradoes—			
Blue Overalls.....	.04¼	"	.05
New Black, soft ..	.03¾	@	.04
Khaki Cuttings.....	.03	"	—
O. D. Khaki.....	.03	"	.03½
Corduroy	.02¾	"	.03
New Canvas.....	.06¾	"	.07¼
B. V. D. Cuttings...	.07	"	.07½

Domestic Rags (Old)

(F. o.b. Boston)

White No. 1—			
Repacked	—	"	2.75
Miscellaneous	2.00	"	2.50
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	1.50	"	2.00
Old Blue Overalls ..	1.60	"	2.00
Thirds and Blues—			
Repacked	—	"	1.25
Miscellaneous	—	"	1.00
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.00	"	1.25
No. 2.....	—	"	1.10
No. 3.....	—	"	.90

Foreign Rags

(F. o. b. Boston)

Canvas	.04¼	@	—
Dark Cottons.....	(nominal)		
Dutch Blues.....	(nominal)		
New Checks and Blues	(nominal)		
Old Fustians.....	(nominal)		
Old Linsey Garments.	(nominal)		
New Silesias.....	(nominal)		

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07¼	@	.07½
New White No. 2.	.04	"	.04½
Light Silesias.....	—	"	.04½
Silesias, No. 1....	—	"	.04½
Black Silesias, soft	—	"	.03¾
New Unbleached..	.05½	"	.06
Washable, No. 1..	—	"	.04
Blue Overall.....	—	"	.05
Cottons—According to grades—			
Washable No. 2...	—	"	.02
New Blue	—	"	.02
Fancy Percales....	—	"	.03
New Black Soft...	—	"	.04
New Light Seconds	.04½	"	.05
New Dark Seconds	—	"	1.55
Khaki Cuttings—			
No. 1 O. D.....	.03½	"	.04
No. 2 Mixed.....	.03	"	.03¼
Corduroy	—	"	.02½
New Canvas.....	.05½	"	.06
New Black Mixed.	—	"	.03

Domestic Rags (Old)

White No. 1—			
Repacked	3.25	@	3.75
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	2.00	"	2.25
Repacked	2.50	"	2.75
Black Stockings (Export)	3.50	"	4.00
Roofing Stock—			
Foreign No. 1....Nominal			
Domestic No. 1..	1.50	"	1.60
Domestic No. 2...	1.35	"	1.45
Roofing Bagging..	—	"	1.30

Bagging

(f.o.b. Phila.)

Gunny, No. 1—			
Foreign .....Nominal			
Domestic	2.50	@	3.00
Manila Rope.....	3.25	"	3.75
Sisal Rope.....	1.75	"	2.00
Mixed Rope.....	1.25	"	1.50
Scrap—			
No. 1.....	2.25	"	2.50
No. 2.....	—	"	1.30
Wool Tares, heavy..	3.50	"	3.70
Mixed Strings	.75	"	1.00
No. 1 New Light Burlap	3.00	"	3.50
New Burlap Cuttings	2.00	"	2.25

Old Papers

(f.o.b. Phila.)

Shavings—			
No. 1 Hard Write	2.25	@	2.30
No 2 Hard White	2.00	"	2.10
No. 1 Soft White	1.85	"	1.90
No. 2 Soft White	1.50	"	1.60
No. 1 Mixed.....	.90	"	1.00
Solid Ledger Stock..	1.50	"	1.60
Ledger Stock, white.	1.40	"	1.45
Ledger Stock, colored	1.10	"	1.20
No. 1 Books, heavy..	.90	"	.95
Manila Cuttings.....	1.75	"	1.80
Print Manila.....	.50	"	.55
Container Manila....	.40	"	.45
Kraft Paper.....	1.00	"	1.10
No. 1 Mixed Paper..	.30	"	.35
Straw Board Chip...	—	"	.40
Binders Board Chip..	.40	"	—
Corrugated Board...	.60	"	.65
Overissue News.....	.70	"	.75
Old Newspapers.....	.50	"	.55

BOSTON

Old Papers

(f.o.b. Boston)

Shavings—			
No. 1 Hard White	2.25	@	2.50
No. 1 Soft White	1.85	"	2.15
No. 2 Mixed.....	.75	"	.80
Solid Ledger Books..	1.30	"	—
Overissue Ledger Stock	1.30	"	1.50
Mixed Ledgers.....	.85	"	.90
No. 1 Books, heavy..	1.00	"	1.10
No. 1 Books, light..	.65	"	.75
Crumpled Stitchless Book Stock.....	.55	"	.65
Manila Env. Cuttings	1.70	"	1.85
Manila Envelope Cuttings, extra quality	2.35	"	2.60
White Blank News..	1.40	@	1.50
No. 1 Kraft.....	1.25	"	1.30
Mixed Papers.....	.22½	"	.25
Print Manila.....	.65	"	.70
Container Manila...	.60	"	.70
Old Newspapers.....	.50	"	.55
Paper Wool Strings..	.90	"	1.00
Overissue News.....	1.00	"	1.10
Box Board Chips....	.50	"	.52½
Corrugated Boxes...	.50	"	—
Kraft corrugated boxes	1.05	"	—
New Kraft corrugated cuttings	1.40	"	1.50
Screening Wrappers	.60	"	.70

Bagging

(f.o.b. Boston)

Gunny Bagging—			
Foreign	—	"	2.85

TORONTO

Paper

Bonds

Direct mill shipment in two-ton lots.			
No. 1 White $36.50		@	—
No. 1 Tints	37.50	"	—
No. 2 White	26.50	"	—
No. 2 Tints	27.50	"	—
No. 2 Golden Rod..	28.50	"	—
No. 3 White	22.00	"	—
No. 4 White	15.50	"	—
No. 4 Tints	16.50	"	—
No. 4 Golden Rod..	17.50	"	—
Direct mill shipment in three-ton lots.			
No. 5 White $10.40		@	—
No. 5 Tints	11.40	"	—
No. 5 Golden Rod..	12.40	"	—
No. 6 White	9.40	"	—
No. 6 Tints	9.90	"	—
No. 6 Golden Rod..	11.40	"	—
No. 7 White	8.40	"	—
No. 7 Tints	8.90	"	—
No. 7 Golden Rod..	10.40	"	—
Book—			
No. 1 M. F.	$7.75	"	—
No. 2 M. F.	7.25	"	—
No. 3 M. F.	6.60	"	—
No. 1 S. C.	8.25	"	—
No. 2 S. C.	7.75	"	—
No. 3 S. C.	6.25	"	—

Coated Book & Litho

Ton Lots (resale)

No. 1 .....$12.15		@	—
No. 2	10.50	"	—
No. 3	9.45	"	—
Coated tinted.....	13.20	"	—
Golden Rod.....	14.80	"	—
Wrapping—delivered—			
Rag Brown.....	4.85	"	5.25
White Wrap.....	4.00	"	—
"B" Manila.....	4.90	"	6.15
No. 1 Manila....	$5.50	@	$6.90
Fiber	5.50	"	6.90
Kraft No. 2.....	5.50	"	6.90

(f.o.b. Cars, Toronto)

News per ton—			
Rolls (contract)..	46.00	"	—
Sheets	54.00	"	—

Pulp

Ground wood.....$36.50		@	—
Unbleached sulphite.	54.00	"	—
Bleached sulphite...	65.50	"	—
Kraft	47.50	"	—
Soda	58.00	"	—

Old Waste Paper

(In carload lots, f.o.b. Toronto)

Shavings—			
White Env. Cut...	2.40	@	—
Soft White.....	2.00	"	2.15
White Blk. News..	1.35	"	1.50
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	"	1.00
Light and Crumpled Book Stock.....	.80	"	.90
Ledgers and Writings	1.15	"	—
Manilas—			
New Manila Cut..	1.55	"	1.60
Printed Manilas...	.70	"	—
Kraft	1.15	"	—
News and Scrap—			
Strictly Overissue	.75	"	—
Strictly Folded ..	.70	"	—
No. 1 Mixed Paper	.60	"	—

CHICAGO

Waste Paper

(f.o.b. Chicago)

Shavings—			
No. 1 White Envelope cuttings..	2.40	@	—
No. 1 Hard White	2.23	"	—
No. 1 Soft White	2.00	"	—
Ledger and Writings	1.20	"	—
Solid Books.....	.95	"	—
Blanks	1.70	"	—
Krafts	1.00	"	—
New Kraft Cuts.....	1.60	"	—
Overissue News.....	.80	"	—
Old Newspapers—			
No. 1 Folded News	.73	"	—
No. 1 Mixed Paper	.63	"	—
Roofing Stocks—			
No. 1	1.25	@	—
No. 2	1.15	"	—